Secretariat of the Pacific Community

ISSN 1025-7497

Issue 24 – December 2008

TRADITIONAL
Marine Resource Management and Knowledge
information bulletin

Inside this issue

Editor
Kenneth Ruddle
Asahigaoka-cho 7-22-511
Ashiya-shi
Hyogo-ken
Japan 659-0012
Email: mb5k-rddl@asahi-net.or.jp

Production
Information Section,
Marine Resources Division
SPC, BP D5, 98848 Noumea Cedex
New Caledonia
Fax: +687 263818
Email: cfpinfo@spc.int
www.spc.int/coastfish

Produced with financial assistance from Australia, France and New Zealand

Editor's note

In this issue we present three articles. In the first, "A preliminary exploration of relationships among fishery management, food security, and the Millennium Development Goals in Melanesia", Simon Foale uses human development indicators (HDIs) to hypothesize scenarios for the relationship among food security, commodity fisheries and human development for Papua New Guinea, Solomon Islands and Vanuatu. The high rates of human population in those countries eventually threaten to upset present stability. Since it has been demonstrated that educating women is the best way to slow human population growth, the author concludes that education in this region should become a priority area for investment.

In "Nearshore fisheries and human development in Vanuatu and other parts of Melanesia", Francis R. Hickey explores both how fisheries may contribute to the furthering of human development, and the need for alternative measures of human development. Conditions in Vanuatu and its Melanesian neighbors provide unique scenarios for exploring alternative human development measures that are not well captured by conventional indicators such as GNP, HDI or MDGs. These ideas are briefly explored from the perspective of the human development goals to reduce poverty, enhance education and promote gender equity. The author's objective is to stimulate more interest within the region on the human development value of nearshore fisheries and on alternative human development models and measures that better reflect Oceania's unique characteristics. Hickey argues for greater recognition of the value of nearshore fisheries, and their inclusion as an important indicator of the human development goals of poverty reduction, education and gender equality.

In the third paper, Yae Sano examines "The role of social capital in a common property resource system in coastal areas: A case study of community-based coastal resource management in Fiji". She analyses the bonding and bridging functions of social capital in community-based coastal resource management. Strong bonds among villagers help disseminate information and knowledge within a community, and a kinship-based village structure contributes to a high degree of accountability among those villagers nominated as fish wardens, and responsible for monitoring marine resources. Sano examines cooperation between NGOs and villagers, and the congruence between institutions and local conditions.

Earlier versions of the papers by Foale and Hickey were presented orally at the 5th World Congress of Fisheries, held in Yokohama 20–24 October

2008. In his presentation at Yokohama, Simon Foale gave an excellent overview of "Gapminder". I had never heard of it, which is not that surprising since there must be an enormous number of interesting things I've not heard about in the very fast-moving world of IT. So I checked it out, found it fascinating — even addictive — and thought it might prove interesting to those readers who also might not have been aware of it. You can check it immediately by skipping the rest of this, and going directly to http://www.gapminder.org.

Very briefly, "Gapminder" is put together by a Stockholm-based non-profit organization, founded in 2005 to promote sustainable global development and achievement of the UN MDGs. It does this by promoting an increased use and understanding of statistics and other information about social, economic and environmental development. For that purpose it developed the "Trendalyzer" software, which converts numbers into animated and interactive graphics. "Trendalyzer", available as "Gapminder World", is a web-service displaying a few time series of development statistics for all countries. Google acquired Trendalyzer in 2006, and since then the Gapminder Foundation has used Trendalyzer to produce free videos (called "GapCast") and web service demonstrating, with the use of animated statistics, major global development trends. A GapCast converts statistical time series into moving graphics that allows trends to be told as simple story lines.

Basically this is an interactive data tool that offers a remarkably stimulating and imaginative way to visualize data. The dynamics are superb; you can run time forward and backwards, to see how any relationships might have evolved.

It is definitely worth playing around with; it only takes a few minutes to figure out, and then you are off on a great trip. I gave myself a quick tutorial by first mapping development indicators. (Select "Map" and search for patterns by selecting different national development indicators.) Next, I selected "Chart", and compared different indicators for different correlations. From that trend analysis is an interesting next step. Finally, I tracked selected countries by selecting them, clicking "Trails", and playing the animation. It is also very worthwhile to watch Hans Rosling's TED presentation, using these tools.

However, a word of caution: these are addictive and potentially misleading tools. They are a way of visualizing correlations, and necessarily anything causal.

Google (which acquired Gapminder's underlying software) also offers the tool as a "gadget", through Google Spreadsheet.

Another interesting effort is "ManyEyes", put together by IBM Alphaworks. You can work with your own datasets and create visualizations from them. Please check them at: http://services.alphaworks.ibm.com/manyeyes/app or http://manyeyes.alphaworks.ibm.com/manyeyes/page/About.html

Kenneth Ruddle

Original text: English

Secretariat of the Pacific Community, Marine Resources Division, Information Section
BP D5, 98848 Noumea Cedex, New Caledonia
Telephone: +687 262000; Fax: +687 263818; cfpinfo@spc.int; http://www.spc.int/coastfish

A preliminary exploration of relationships among fishery management, food security, and the Millennium Development Goals in Melanesia

Simon Foale[1]

Abstract

In this article I use the lens of the human development indicators (HDIs) to hypothesize scenarios for the relationships among food security, commodity fisheries and human development for Papua New Guinea, Solomon Islands and Vanuatu. Although the present low human population densities in these countries mean that food security, including subsistence fisheries, is largely intact, high rates of human population growth will likely pose threats to this security within three decades. A large body of research shows that educating women is the best way to slow human population growth, but education levels in Melanesia, particularly for women, are very low by world standards. I examine the potential and actual contribution to investment in education from commodity fisheries and other primary production sectors in Melanesia, and conclude that considerably more could be spent by both individual families, and the state, on education in this region.

Introduction

Melanesian nearshore commodity fisheries appear to be in crisis. A number of potentially lucrative export fisheries, most notably beche-de-mer, have recently been closed down by the governments of Vanuatu and Solomon Islands. It is likely that Papua New Guinea (PNG) will do the same next year. Overharvesting is widespread, and it is likely that stock collapses and recruitment failures are now a reality across large expanses of habitat throughout the region for some of the most severely depleted species, such as sandfish (*Holothuria scabra*), green snail (*Turbo marmoratus*) and giant clam (*Tridacna gigas*). Trochus fisheries appear to remain productive, but at very low levels compared with well-managed fisheries in parts of Polynesia and Micronesia (Foale 2005; Foale and Day 1997; Ramohia 2006; Amos 2007; National Fisheries Authority [Papua New Guinea] 2005b, 2007).

In contrast, subsistence fisheries, particularly coral reef finfish, appear, on average, to be in much better shape, and this is without doubt primarily because markets for these species are generally limited to regional centres. Indeed, around many of these regional centres finfish tend to be overfished as well (Cinner and McClanahan 2006; National Fisheries Authority [Papua New Guinea] 2005a; Sabetian and Foale 2006). A second reason for the healthy status of coral reef finfish populations in Melanesia is that subsistence pressure is limited by the relatively small number of people in these countries. The nation states of PNG, Solomon Islands and Vanuatu share the distinction of having exceptionally low human population densities (14, 18 and 19 people km^{-2}, respectively). These low levels of subsistence pressure on both marine and terrestrial resources mean that most people enjoy a relatively high level of food security. The threat of "Malthusian overfishing" (Pauly 1994; Pauly et al. 2002) looms less large in this part of the world than in many parts of Southeast Asia, where population densities are up to an order of magnitude higher (280 and 117 people km^{-2} for the Philippines and Indonesia, respectively). There are, however, a few densely populated places within PNG and Solomon Islands where threats to food security have been observed. In some cases high human population densities are supported by a range of economic activities, including traditional trading and commodity fisheries (Foale 2005).

Can fishing income improve human development?

Given that a significant proportion of the earnings from commodity fisheries would be surplus to subsistence needs for most people in PNG, Solomon Islands and Vanuatu, how significant a con-

1. Australian Research Council Centre of Excellence for Coral Reef Studies, James Cook University, Townsville, Queensland 4811, Australia. Ph: + 61 7 4781 6785; Fax: + 61 7 4781 6722; Simon.foale@jcu.edu.au and http://www.coralcoe.org.au/research/simonfoale.html

tribution is made by the income from commodity fisheries, past, present and future, to the Millennium Development Goals (http://www.undp.org/mdg/; Table 1)?

Table 1. Millennium Development Goals (MDGs)

MDG 1	Eradicate extreme poverty and hunger
MDG 2	Achieve universal primary education
MDG 3	Promote gender equality and empower women
MDG 4	Reduce child mortality
MDG 5	Improve maternal health
MDG 6	Combat HIV/AIDS, malaria, and other diseases
MDG 7	Ensure environmental sustainability
MDG 8	Develop a global partnership for development

For the purposes of this discussion, I lump MDGs 2–6 into the broad category of "health and education", and will focus mainly on these, and MDG 7 ("ensure environmental sustainability"). It is also important to observe that the MDGs, particularly 2–6, are essentially specific target levels for a range of human development indicators (HDIs), and that HDIs are summarized each year by the United Nations Development Program (UNDP) in their annual reports, as well as presented in full on their website in a range of formats (http://hdr.undp.org/en/statistics/data/). HDI data summaries are also available on the Gapminder (www.gapminder.org) website, where relationships between many indicators can be graphically represented on a highly accessible and instructive platform. The strong correlations between per capita income and life expectancy, infant mortality, fertility and literacy show very clearly that money buys human development. But the efficiency with which cash income is converted to improvements in HDIs depends to a large degree on effective and enlightened governance at all scales. Other important factors influencing human development include social cohesion (positively) (Kawachi et al. 1997; Putnam 1995) and economic inequality (negatively) (Marmot 2004; Wilkinson 2005).

In the context of fishing in Melanesia, two key challenges are immediately apparent:

1) existing data (see below) suggest that a significant proportion of the cash generated by exporting primary products, including commodity fishery species, is consumed instead of being invested in education, health, or other MDGs (i.e. an economic response something akin to "Dutch disease" or the "resource curse" [Auty 1993; Foale 2008]); and
2) although human population densities are not high at present, they are growing rapidly (1.9%, 2.4% and 2.6%, respectively for PNG, Solomon Islands and Vanuatu), and this rapid growth will increasingly threaten the sustainability of subsistence fisheries and food security generally, over the next three or so decades (Bell et al. in press). Table 2 shows some of the current human development indicators for PNG, Solomon Islands and Vanuatu, compared with the Philippines and Indonesia.

Guaranteeing food security by educating women

The high rate of population growth is in itself an indication of major improvements in health (and other human development indicators) over the past 50 or more years, which have reversed the disastrous depopulation that occurred in the region following contact with European whalers and traders (Rivers 1922). But health and education services in this region are nevertheless very low by world standards. A quarter of a century of research has shown that educating women is the most effective way to reduce female fertility, and, in turn, slow human population growth (Jejeebhoy 1995; Sen 1994, Basu 2002). Investment in female education is something that is undertaken by both the state and by individual families. The state provides schools, teachers and curricula, while families are usually expected to pay fees to send their children to school.[2] However, in PNG, Solomon Islands and Vanuatu, poorly functioning government hinders the role of the state, while various cultural barriers apparently prevent families from playing their role in the national educational system.

A key challenge arises because most artisanal fishing is done by men who, according to a significant body of evidence, tend to have a lower commitment to spending on the health and education of their children than do women (Gibson 2000; Macintyre 2008a; McMurray et al. 2008). There is also a growing body of anthropological analysis demonstrating the importance of conspicuous alcohol consumption as an integral part of displays of competitive, modern masculinity in Melanesia (Bainton 2008; Macintyre 2008b) — consumption that frequently takes priority over school fees and medical expenses. However, despite the compelling nature of these arguments and data sets, obtaining reliable quantitative measures of spending patterns among fishers in the region remains difficult. Some of the best available data on spending by people surveyed in a fisheries-

2. There are non-state institutions, especially churches, also providing health and education services in the region.

Table 2. Human development indicators* for four countries within the Coral Triangle, 2007

	Papua New Guinea	Solomon Islands	Vanuatu	Philippines	Indonesia
Population density (people km^{-2})	14	18	19	280	117
Population growth rate 2005–2015 (% year^{-1})	1.9	2.2	2.3	1.8	1.1
Per capita income (US dollars)	1869	1538	3225	2907	4006
Life expectancy at birth	57	63	69	71	70
Infant mortality (per 1000 births)	54	55	38	24	26
Fertility (total children per woman)	3.7	3.8	4.2	3.2	2.1
Female literacy (%) **	50.9	72	73	94	86
Primary school completion (girls) (%)**	50	59	91#	100	100

* http://hdr.undp.org/en/statistics/
**2005 data
2003 data

related socioeconomic survey is given in the reports generated by the PNG National Fisheries Authority's Coastal Fisheries Management and Development Project (National Fisheries Authority [Papua New Guinea] 2005a). Household expenditure data from their northern New Ireland survey are summarized in Table 3.

Table 3. Summarized average household expenditure data, based on a sample of 600 households, from the National Fisheries Authority's 2005 socioeconomic survey in New Ireland Province, PNG.

Item of monthly expenditure	Proportion of household income used (%)
Fuel	23.3
Betelnut	18.4
Food	17.1
Alcohol	10.1
School	9
Wantoks*	6
Household	4.5
Clothing	3.6
Public transport	3.5
Church	3.2
Medical	1.2

* wantok is a term more or less synonymous with "relative", and is typically used in relation to the common Melanesian practice of demanding money or goods from relatives who are deemed to be capable of sharing. Such demands are rarely refused.

The following generalizations were made by this study:

1. The most commonly identified causes of social problems in the sample are alcohol (27% of problems) and drugs (20%).
2. While men and women were said to exercise similar levels of control over household income, men were said to control all of the money that was spent on alcohol.
3. The sample was strongly polarized on the subject of whether it was easy for children in their village to get an education, with the most important barriers to education identified as large distances to the nearest school, and high cost of transport, in addition to high school fees.
4. The average cost of educating children in this area was PGK 981 (USD 372) per household per year, while average income was reported as between PGK 485 (USD 190) and PGK 517 (USD 202) per month, depending on the context in which the question was asked.
5. 50% of households reported being able to meet the costs of education, while 17% said they could not (the remaining responses were "no answer", "sometimes", "don't know").
6. Fishing accounted for 13.6% of the monthly income on average for the households surveyed, which is significantly lower than employment and farming in terms of total income. However, fishing and farming were also identified as the two most common sources of income, indicating that income from fishing is more widely distributed in coastal communities than other sources of income (other than farming).

Overall, the data from the National Fisheries Authority's study show that a larger proportion of household income could potentially be spent on education (and health) than is currently the case, and that such a reallocation of spending would require a greater behavioral change for men than for women. However, it is also clear that these issues are impossible to dissociate from the broader context of social and economic change, and Melanesian gender relations (Macintyre 2008a, 2008b; McMurray et al. 2008).

Economic importance of artisanal fisheries relative to other sectors

As indicated in point 6 above, a key feature of artisanal fishing in Melanesia is that it is an economic sector accessible to a large proportion of the population. Most people in Solomon Islands and Vanuatu live on the coast, and, with some exceptions (especially on Efate Island in Vanuatu where most coastal land is now in foreign hands), the traditional rights that most coastal people claim over nearshore marine resources are recognized by the state. If managed well, the sector has the potential to provide a steady stream of revenue to many rural people. Despite the relatively egalitarian economics of artisanal fisheries, their overall contribution to the economies of these nation states is surprisingly small. In PNG, the mining sector dwarfs all other resource sectors in terms of export revenue, and in the Solomon Islands, the forestry sector currently accounts for about 70% of exports, with the industrial tuna fishery making up most of the rest. These two cases highlight the importance of the potential contribution by the state towards the MDGs, relative to that of artisanal fishers. The low level of service provision in PNG and Solomon Islands is really an indication of poor governance and the failure to divert revenue from lucrative exports into critical services such as health and education. However, there are interesting exceptions. New Ireland Province in PNG has benefited from a large gold mine in the Lihir group of islands for the last 11 years, and this year (2008) has finally managed to capture enough of this wealth to waive 75% of the school fee for all primary students in the province (Dr Nick Bainton, University of Queensland, pers. comm.).

Conclusion

The relationship between the artisanal fishing sector and the MDGs at present exists as part of a complex feedback loop, where human population density, fishery production (which is contingent on management effectiveness) and spending patterns influence the capacity for fisheries to contribute to health and education. In turn, education influences population growth rates by its effect on female autonomy, which in turn determines the future pressures on both artisanal and subsistence fisheries. Management interventions at both state and community level have the potential to improve artisanal fishery performance, but the overall progress this promises for achieving the MDGs must be disentangled from the contributions that the other resource sectors — including agriculture, minerals, timber and tuna — make (or fail to make) towards the MDGs.

Finally, are the MDGs the best lens through which to study human development in this part of the world? Is happiness correlated with longevity, health and literacy? In this context, the global happiness index[3] raises some interesting questions concerning the poverty-environment relationship. It posits a "Happiness Kuznets Curve", where the high HDIs in the richest countries have come at a disproportionately high environmental cost. People in rich countries have a huge environmental footprint, but while their HDIs are near the top of the range, they are not significantly (if at all) happier than people with slightly lower HDIs and considerably smaller environmental footprints. Since there is a strong correlation between per capita income and the health and education indicators, and since income in the Pacific Islands region derives mainly from primary resources, all of which are limited, this begs the question, how much improvement in health and education is enough, and how much can the region's resources provide? Finally, how much should the contribution to health and education from fisheries be subsidized by income from other resource sectors, or indeed from development assistance programs, and what can be done to change the spending patterns of both governments and fishers?

References

Amos M. 2007. Vanuatu fishery resource profiles. Apia, Samoa: Secretariat of the Pacific Regional Environment Programme. 208 p.

Auty R. 1993. Sustaining development in mineral economies. London: Routledge. 272 p.

Bainton N. 2008. Men of kastom and the customs of men: Status, legitimacy and persistent values in Lihir, Papua New Guinea. The Australian Journal of Anthropology 19(2):194–212.

Basu A.M. 2002. Why does education lead to lower fertility? A critical review of some of the possibilities. World Development 30(10):1779–1790.

3. http://www.neweconomics.org/gen/z_sys_publicationdetail.aspx?pid=225 2006

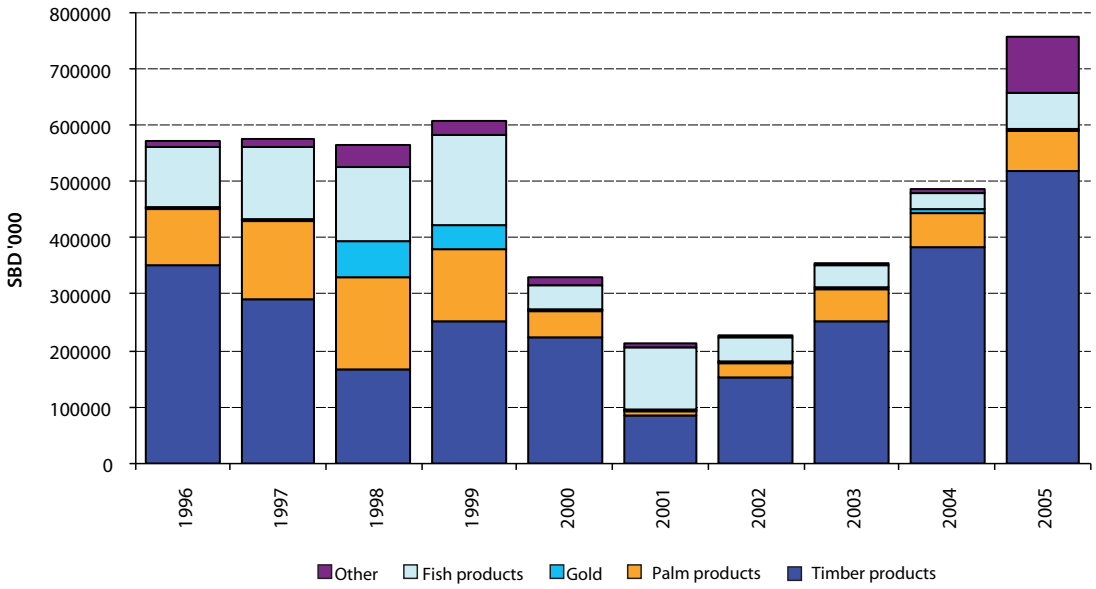

Figure 1. Solomon Islands export figures for the period 1996–2005. Export revenues were influenced by the coup that occurred in June 2000, and by the Regional Assistance Mission that began in late 2003. Data courtesy of Ross Andrewartha of the AusAID Forestry Management Project in the Solomon Islands. "Fish products" comprises mainly tuna; SBD 1 = USD 0.13.

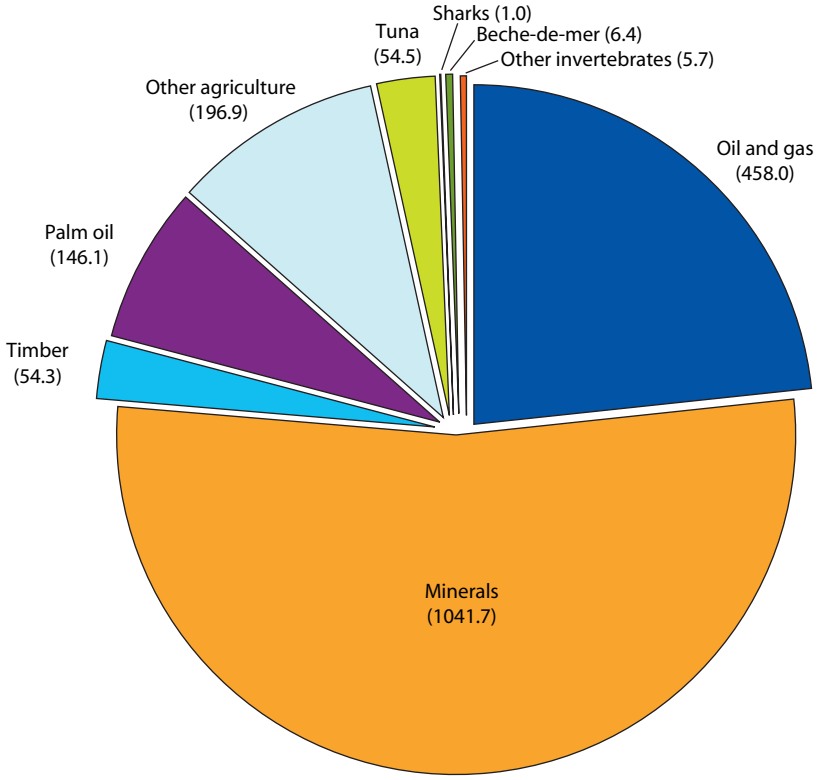

Figure 2. Main exports from PNG, 2003. Income from beche-de-mer reached over USD 11 million for the country in 2006, but the fishery is likely to be closed by the National Fisheries Authority for three years from 2009, owing to concerns about worsening damage to stocks from overharvesting.

Bell J.D., Kronen M., Vunisea A., Nash W.J., Keeble G. Demmke A., Pontifex S. and Andréfouët S. in press. Planning the use of fish for food security in the Pacific. Marine Policy.

Cinner J.E. and McClanahan T.R. 2006. Socioeconomic factors that lead to overfishing in small-scale coral reef fisheries of Papua New Guinea. Environmental Conservation 33(1):73–80.

Foale S.J. 2005. Sharks, sea slugs and skirmishes: managing marine and agricultural resources on small, overpopulated islands in Milne Bay, PNG. Canberra, Resource Management in Asia Pacific Program, The Australian National University. 58 p.

Foale S.J. 2008. Conserving Melanesia's coral reef heritage in the face of climate change. Historic Environment 21(1):30–36.

Foale S.J. and Day R.W. 1997. Stock assessment of trochus (*Trochus niloticus*) fisheries at West Nggela, Solomon Islands, with notes on management. Fisheries Research 33:1–16.

Gibson J. 2000. Who's not in school? Economic barriers to universal primary education in Papua New Guinea. Pacific Economic Bulletin 15(2):1–13.

Jejeebhoy S. 1995. Women's education, autonomy and reproductive behaviour: experience from developing countries. Oxford: Clarendon Press. 306 p.

Kawachi I., Kennedy B.P., Lochner K. and Prothrow-Stith D. 1997. Social capital, income inequality, and mortality. American Journal of Public Health 87(9):1491–1498.

Macintyre M.A. 2008a. in press. Matrilineal structures and patriarchal attitudes: Lihirian women's health. In: Jolly M. and Lukere V. (eds). Women's health in the Pacific. Canberra: Australian National University Press.

Macintyre M.A. 2008b. Police and thieves, gunmen and drunks: Problems with men and problems with society in Papua New Guinea. The Australian Journal of Anthropology 19(2):179–193.

Marmot M. 2004. The status syndrome: How social standing affects our health and longevity. New York: Times Books. 319 p.

McMurray C., Foale S., Roberts P., Breen B. and Cann-Evans S. 2008. People's survey 2008. Canberra, AusAID. 134 p.

National Fisheries Authority (Papua New Guinea) 2005a. Small-scale-fisheries related socio-economic survey of New Ireland Province, Papua New Guinea. Port Moresby, Papua New Guinea: National Fisheries Authority and the ADB Coastal Fisheries Management and Development Project. 88 p.

National Fisheries Authority (Papua New Guinea) 2005b. Small-scale fisheries in New Ireland Province: Landing, market and buyer surveys in Kavieng. Port Moresby, Papua New Guinea: National Fisheries Authority and the ADB Coastal Fisheries Management and Development Project. 77 p.

National Fisheries Authority (Papua New Guinea) 2007. Small-scale fisheries in Milne Bay Province: Landing, market and buyer surveys in Alotau. Port Moresby, Papua New Guinea: National Fisheries Authority and the ADB Coastal Fisheries Management and Development Project. 43 p.

Pauly D. 1994. From growth to malthusian overfishing: Stages of fisheries resources misuse. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 3:7–14.

Pauly D., Christensen V., Guenette S., Pitcher T., Sumaila U., Walters C., Watson R. and Zeller D. 2002. Towards sustainability in world fisheries. Nature (London) 418: 689–695.

Putnam R.D. 1995. Bowling alone: America's declining social capital. Journal of Democracy 6:65–78.

Ramohia P. 2006. Fisheries resources: Commercially important macroinvertebrates. p. 530. In: Green A., Lokani P., and Atuet W. (eds). Solomon Islands marine assessment: Technical report of the survey conducted May 13–June 17, 2004. Brisbane: The Nature Conservancy.

Rivers W.H.R. (eds). 1922. Essays on the depopulation of Melanesia. Cambridge, Cambridge University Press. 116 p.

Sabetian A. and Foale S.J. 2006. Evolution of the artisanal fisher: Case-studies from Solomon Islands and Papua New Guinea. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 20:3–10.

Sen A. 1994. Population and reasoned agency: Food, fertility and economic development. p. 51–78. In: Lindahl-Kiessling K. and Landberg H. (eds). Population, economic development and the environment. Oxford: Oxford University Press.

Wilkinson R.G. 2005. The impact of inequality: How to make sick societies healthier. London: Routledge. 355 p.

Nearshore fisheries and human development in Vanuatu and other parts of Melanesia

Francis R. Hickey[1]

Abstract

There is a nascent interest in both how fisheries can contribute to the furthering of human development, and the need for alternative measures of human development. Vanuatu and neighboring countries in Melanesia share high levels of customary land and/or reef tenure systems, dichotomous economies between urban and rural areas, and a wealth of pre-existing or traditional knowledge systems for promoting household food and social security. These conditions provide unique scenarios for exploring alternative human development measures that are not well captured by conventional indicators such as gross national product (GNP), human development index (HDI) or Millennium Development Goals (MDGs). These ideas are briefly explored from the perspective of the human development goals of reducing poverty, enhancing education and promoting gender equity, and with the objective of stimulating more interest within the region in the human development value of nearshore fisheries, and developing alternative human development models and measures that better reflect Oceania's unique characteristics. This paper argues for greater recognition of the value of nearshore fisheries and their inclusion as an important indicator of the human development goals of poverty reduction, education and gender equality.

Introduction

The Republic of Vanuatu is an archipelago of some 83 islands inhabited by a predominantly Melanesian population of 229,000, divided into more than 110 different cultural-linguistic groups. This gives Vanuatu one of the highest per capita cultural diversities in the world. It remains a United Nations least developed country (UNLDC) with a per capita GDP of USD 1500. That has increased 5–7% per annum over the last three years (Gay 2008), largely as a result of the forces of globalization and the adoption of a foreign investor oriented development policy as well as high global commodity prices. In particular, tourism, coastal real estate[2] and associated services industry have grown (Gay 2008.).

This economic growth has been concentrated largely in the two urban centers, where 20% of the population resides. Rural areas, where 80% of the population continues to live on their traditional lands, rely primarily on an agricultural and fisheries based economy. The disparity in economic growth reflects the strongly dichotomous nature of Vanuatu's economy: the formal cash-based economy operating in the urban centers and the largely "cash-less" informal or "traditional economy" of rural areas. With economic growth mainly concentrated in fast growing urban areas, the disparity between the "haves and have-nots" widens, and provides a backdrop that may lead to increasing crime and social unrest (Gay 2008).

Throughout much of rural Melanesia, people continue to live a non-commercial or subsistence lifestyle supported by pre-existing knowledge systems, and where there is virtually no unemployment and a significant amount of leisure time. These knowledge systems include support and barter networks among extended families, along with customary land and marine tenure systems that allocate access rights within kinship groups.

The dichotomous economy: Rural vs urban economies

Most Melanesian economies are highly dichotomized into the formal (cash) economy of urban centers, and the informal or traditional economy of rural areas based on traditional wealth systems. The traditional economy includes not only access to land and resources, but also forms of social currency that include exchange, barter, credit and social capital networks, and traditional knowledge and resource management systems that are used for promoting household food and

1. Vanuatu Cultural Centre, PO 184, Port Vila, Vanuatu. Email: francishi@vanuatu.com.vu
2. On the central island of Efate, extensive coastal areas are now alienated largely for expatriate housing and some tourism development. Conflicts over access to traditional fishing grounds are becoming increasingly common as luxury subdivisions and resorts now make access difficult for reef custodians, and hamper their ability to monitor and manage marine resources. This in turn adversely affects livelihoods and contributes to the erosion of customary marine tenure systems.

social security. These forms of social currency are largely intangible, so, by definition, they are difficult to measure or valorize.

Tangible traditional wealth items used in exchange rituals include land, pigs, mats, greenstone, kava, yams and numerous other food items and marine resources, such as turtle and turtle shell jewellery, shell money, fish, and shellfish, among other items. Papua New Guinea's *kina* and Fiji's *tabua* are other well known marine examples. Traditionally in Vanuatu, coastal villagers bartered marine resources in inland exchange networks, in exchange for crops and other resources from inland areas (Hickey 2006, 2007). Inter-island exchange systems between trade partners also existed throughout the archipelago (Huffman 1996). These systems of barter allowed for the redistribution of food and other resources between different island biomes during times of seasonal abundance, while strengthening kinship alliances and maintaining peaceful relations among trade partners (Hickey 2006, 2007).

Definition of poverty

Many of these wealth items, however, are not captured by GDP or HDI,[3] yet support most rural Melanesian populations as well as many urban dwellers who remain, to varying degrees, part of rural barter systems. Access to land and marine resources also provides opportunities for participation in the market economy that, in turn, furthers human development options by increasing access to education and healthcare systems. This creates the rather unusual situation in Vanuatu and other parts of Melanesia where an extended family may have custodianship of over 300 hectares of fertile mountainside that slopes down to a long white beach fringed by a large fringing reef teaming with marine life. This is part of their corporate estate, yet they are labelled by most international development measures as being poor and living in poverty!

However, a recent economic study in Vanuatu by the New Zealand Agency for International Development and the Australian Agency for International Development reports that "many of the functions of modern growth — well-being, stability, equity, social cohesion and sustainable livelihoods for an expanded population — are also well provided for through Vanuatu's strong and deeply held customary values including its custom economy" (Beazely and Mullen 2006). It was also noted that the traditional, largely non-monetarized, rural economy has successfully managed to absorb a 90% rural population increase since Independence (in 1980), without resulting in food shortages or a landless class of people, and that the "most understated productive-sector success is the massive response within its traditional (island) economy to a rapidly growing population. Historically, Vanuatu's traditional economy has supported populations that were much higher again" (Beazely and Mullen 2006).

In the Melanesian context, development efforts and measures such as MDGs or HDI concepts of

A family returning from the garden, happily leaving a minimal environmental footprint (Image: F. Hickey).

3. An important alternative to GDP is HDI, developed in 1990. It includes measures of life expectancy (at birth), literacy and educational attainment, as well as GDP. The UN adopted this measure for comparing countries as well as for classifying them as developed, developing or under-developed. That, in turn, relates to the level of aid support available to them. Critics of HDI conclude that while it moves toward considering social indicators beyond GDP, it is still considered a crude measure of human development and is of limited value for making inter-temporal comparisons.
4. Poverty is measured in these two models through per capita GDP and the proportion of people living on less than USD 1/day.

poverty[4] should be closely re-examined, as much of the capital possessed by ni-Vanuatu, such as traditional rights to land and resources and social capital in the form of exchange networks, is not captured by GDP, HDIs or MDGs. In reality, whereas it is estimated that 51% of rural people live on less than USD 1/day (ADB 2003), there is very little real poverty (with the exception of some makeshift urban settlements). It is noteworthy that in 2006, Vanuatu was recognized as the "happiest country in the world" by the UK-based New Economics Foundation, which published "The Happy Planet Index" (HPI).[5] This ranking was based on the three indicators of well being: life satisfaction, life expectancy and ecological footprint all of which reflect resource use sustainability.[6]

Starting in 2004, the traditional economy model was promoted within Vanuatu by the Vanuatu Cultural Centre with the support of UNESCO. This is viewed as the most appropriate sustainable livelihoods development model that holistically incorporates all sectors (with the management of resources as a pivotal sector) and that is by definition pre-adapted to the Pacific's cultural milieu (Ruddle and Hickey 2008). Based on the promotion of this model, the national government recognized its relevance, and adopted it as their national development theme in 2007 and again in 2008.

The national government recognized that the traditional economy contributes significant capacity to provide food and social security, employment, livelihood diversity, good governance, life-satisfaction, and sustainable human development. At the same time it provides self-reliance and resilience to buffer the national economy in the face of international market economy swings and crashes, like those currently being experienced in late-2008. For example, tourism development, mainly centred on three islands, now generates nearly 20% of Vanuatu's GNP. However, with the now emerging global financial crisis this sector is expected to be one of the first to decline. Australians, the main visitors to Vanuatu (Gay 2008), are being encouraged by their government to spend holidays at home to help offset the financial crisis (Pacific Pulse 2008). It will therefore be important over the next few years for communities and households who have increasingly relied on tourism for livelihoods to revitalize their traditional economies, to strengthen household food and social security to resist negative impacts resulting from global economic fluctuations.

Melanesia's cultural landscape: The need for alternative indigenous development models and measures

The cultural landscape that supports and is integral to the rural or traditional economy in Vanuatu includes the following general characteristics:

- Most land/reefs remain under customary tenure (97%);
- Day-to-day use of vernacular languages in communities (Vanuatu has an estimated 113 vernacular languages);
- Traditional kinship ties and relationships provide the major form of social organization and currency;
- 80% of people produce their own nutritious organic food from gardens supplemented by small-scale livestock and from fishing;
- A tradition of non-specialization remains strong, assisting in spreading risk and promoting household food and social security in the face of external threats such as cyclones, earthquakes, tsunamis, etc;
- Ritual life is strongly observed on many islands, and still dominates the focus of most communities' energies;
- Rituals serve to redistribute wealth and strengthen relationships. Vanuatu's rural economy is not traditionally a culture of wealth hoarding, but one of wealth accumulation for redistribution purposes; and
- Traditional governance and leadership remains an important element of social organization, and includes restorative conflict resolution mechanisms, including for resource management.

Although much of this cultural landscape extends throughout Melanesia and other parts of Asia and the Pacific, many island groups have experienced high rates of erosion of these characteristics from the impact of colonialism and the application of Western development models. Soon after European contact, land and marine tenure systems as well as traditional leadership systems were often targeted by colonial powers for pacification and westernization (Nari 2000; Van Trease 1987; Crocombe 1987). Many countries continue to struggle with fragmented systems of traditional governance and land/reef tenure systems (Johannes 1978; Foale and Manele 2004). These systems of land/reef tenure and local governance, however, remain central to effective pre-existing or traditional systems of natural resource management (Johannes and Hickey 2004).

5. www.happyplanetindex.org
6. The HPI index was developed by the New Economics Foundation to consider not only human well-being but also the environmental cost or sustainability of maintaining that well-being. In that respect it is not really an index of "happiness" (which remains extremely subjective and so resists quantification) but is more a measure of environmental efficiency of supporting well-being, or an estimate of the amount of natural resources used to sustain a nation's lifestyle. It effectively operationalizes the IUCN's call for a quantification of the measure of the production of human well-being (not necessarily material goods) per unit of extraction of or imposition upon nature (Adams 2006).

Strategies to promote diversification of household and social security are not limited to the Pacific Islands, but are also practiced throughout Asia and other parts of the world. Diversification of livelihood strategies assists in not only enhancing household security by drawing on a range of options and opportunities, but also reducing pressure on natural resources thereby proactively reducing vulnerability of households and communities to shocks or stresses arising from seasonal cycles of tides, resource abundance and availability and external changes such as climatic variability and change (Nowak 2008, Hickey 2007). Diversification of household security promotes long-term household and community resilience and adaptability while actively maintaining a broad range of skill sets.

Economic value of agriculture and offshore, coastal and nearshore fisheries in Vanuatu

Measures of fisheries production and contribution to GDP in the Pacific region are often aggregated with data for the agricultural, forestry and livestock sectors. From a census and livelihoods point of view, this makes sense as they are all inextricably linked in rural economies. In recognition of the traditional economy, the Vanuatu National Statistics Office (NSO) estimates and includes subsistence production for both agriculture (including forestry and livestock) and fisheries in GDP estimates. Total agriculture subsistence and commercial production accounted for approximately 14.3% of Vanuatu's overall GDP in 2007 (NSO 2008). The overall contribution of both commercial and non-commercial fisheries to Vanuatu's GDP was estimated at only 1%. This is in comparison to the services sector, which contributes some 72% towards GDP, including the main contributors of wholesale and retail trade, transport and communication, tourism, government and offshore banking sectors, all primarily located in the urban centers. However, agriculture (including forestry, livestock and fisheries), along with subsistence contributions, represents the second highest contributor towards the GDP, and engages more people than any other sector (Gay 2008).

The estimated small contribution of fisheries to GNP is a somewhat misleading indication of its national contribution to human development, as a 2006 agricultural census indicates 86% of rural and 48% of urban people (for an overall mean of 78%) depend on nearshore and coastal fishing for subsistence and/or income generation, up from a mean of 61% in the 1999 survey (NSO 2006). A more detailed census of fishing activities indicates that rural households make, on average, three fishing trips per week (NSO 2007) to support household food security. In fact, the value of the nearshore subsistence catch in most Pacific nations, including Vanuatu, was estimated to be worth more in economic terms than commercial coastal catches (Dalzell et. al. 1996). For Vanuatu, it was estimated that the nominal value[7] of the annual subsistence catch totaled USD 1,953,360 while the commercial coastal catch was valued at USD 1,514,364, giving a total for both of 3,467,724 (Dalzell et. al. 1996). Although these estimates are now outdated, they indicate the value of these fisheries. Interestingly, both of these figures exceed the value from resource rental derived from foreign flagged vessels to access offshore tuna resources, estimated at USD 1,000,000 for Vanuatu[8] (Department of Fisheries 2007).

Irrigated taro ponds where fish, prawns and eels fertilize the taro (Image: F. Hickey).

However, non-commercial catches used for home consumption are not always considered in Pacific Islands' fisheries contributions to GDP. This results in an under-estimation of the value of their contribution to GDPs, as well as not acknowledging sub-

7. For this study, calculation of their monetary value was based on what they would have sold for. Access to fresh, nutritious seafood also assists in import substitution and, therefore, towards alleviating Vanuatu's trade imbalance, while contributing positively to the nation's nutritional status.
8. This relatively low value realized from the commercial offshore tuna resources occurs because tuna catches are processed elsewhere, which results in the loss of value-added opportunities in Vanuatu. (The potential for onshore facilities to add value to tuna catches and create employment and underpin further human development in Vanuatu and other Pacific countries is beyond the scope of this article.)

sistence fisheries (Zeller et al. 2005). Moreover, even when the contribution of small-scale subsistence fisheries to GDP is estimated, these researchers found that they may be significantly underestimated, thereby contributing to their further marginalization (Zeller et al. 2005). Similar findings were made by Gillett and Lightfoot (2001), when they noted that fisheries contribution to GDP is underestimated in most Pacific countries. Reasons for this included the omission of subsistence catches in official figures (e.g. Papua New Guinea and Federated States of Micronesia) and widely varying methods used by different countries to calculate fisheries production and contribution of fisheries to GDP. After standardizing and recalculating fisheries contribution to GDP, the value across the Pacific Islands surveyed was found to average 7% versus 5.4% prior to standardization (Gillett and Lightfoot 2001).

Nearshore catches are also generally made with minimal capital investments, thereby reducing intermediate costs and resulting in higher value-added ratios (Gillett and Lightfoot 2001) and greater net profits to fishers. Nearshore catches in Vanuatu are often made on foot from shore, over fringing reef flats, or along reef drop-offs or lagoons from outrigger canoes. Cast nets and gill nets, free-diving gear and spearguns, handlines and traditional methods (reef gleaning, spears, traps, etc.) are also typically used. The low investment needed to enter nearshore fisheries ensures accessibility to all, and at a low financial risk.

Promoting gender equality

Whereas coastal and offshore waters are normally restricted to men using powerboats and other capital investments, access to the nearshore is widely available to women and children. Women's contribution to fisheries in the Pacific and worldwide is often understated and underacknowledged (Williams 2008; Nowak 2008). A commonly promoted theme in human development indices, including MDGs, includes the empowerment of women and gender equity. Traditional access to nearshore resources by women in the Pacific advances this goal, as women remain the quintessential nearshore fishers on most islands. Moreover, research on women's fisheries in the Pacific reveals women are not just gleaners but are involved in all aspects of fisheries, from harvesting through processing to marketing. They make fundamental contributions to local food security, and in so doing often free-up time for males of the family for commercial fishing activities. Women are increasingly involved in both food and commercial fisheries that use modern technologies as well as employing their traditional skills and ecological knowledge (Novaczek and Mitchell 2004).

Most rural-based women fishers use their catches primarily to ensure household food security. Since no cash is involved, these fisheries are viewed by policy-makers and donors as less important than commercial fisheries (Novaczek and Mitchell 2004). However, women are becoming increasingly involved with commercial fisheries, including for trochus, as well as in adding value to their catches. Many women with access to markets in Vanuatu, collect fish, octopus and shellfish, including giant clams, for preparation with traditional puddings covered in coconut cream to produce a value-added product for sale in municipal markets or other popular outlets, such as kava bars. Alternatively, some women in the urban areas simply purchase reef fish from urban outlets for preparation in puddings for sale at various outlets, thereby adding value to these catches. Conversely, most male fishers simply sell their catch without any addition of value. It has also been observed in Vanuatu and elsewhere that income generated by women's fisheries and value-adding activities are largely devoted to household food security and educational purposes, whereas income from men's catches are not always available to meet these needs (Kronen and Vunisea 2007).

Women perform their fishing, value-adding and marketing activities amidst a range of other household activities (again, largely unpaid and underacknowledged), including gardening, child care, providing healthcare, household management,

Women and children providing household food security by reef gleaning (Image: F. Hickey).

and other roles that embody an exceptional range of gender specific skills and traditional knowledge. Yet the management value of this knowledge, particularly of nearshore resources, remains largely untapped (Tarisesei and Novaczek 2005). Research has shown that, in part, the predominantly male-oriented Western fisheries paradigm promoted in Oceania has contributed to promulgating this stereotyping and undervaluing of women's roles (Novaczek and Mitchell 2004).

Promoting awareness of women's roles in making critical contributions to household food and social security, and their gender specific knowledge of nearshore habitats and their management, would assist in improving recognition of the true value associated with women's fisheries and potential management contributions. Owing to the nature of women's gender specific roles and knowledge systems in Oceania, employing women fisheries field officers would help facilitate the fuller participation of women in fisheries development, particularly by promoting better extension and other communication.

Nearshore fisheries management, customary marine tenure, traditional ecological knowledge and education

Aside from national fisheries regulations that impose size limits on specific nearshore commercial resources, such as trochus, beche-de-mer and green snail, and which protect turtles and control the export of marine products, the management of nearshore reefs is vested primarily with traditional reef custodians, through customary marine tenure (CMT). CMT is legally recognized in Vanuatu in Chapter 12 of the Constitution, which states;

> Article 73: 'All land in the Republic of Vanuatu belongs to the indigenous custom owners and their descendants in perpetuity.'
>
> 'Land' is further defined in the Land Reform Act to include ….'land under water including land extending to the sea side of any offshore reef but no further.…
>
> Article 74: 'The rules of custom shall form the basis of ownership and use of land in the Republic of Vanuatu.'

These articles provide customary owners rights to manage their land and reefs as they have traditionally done for centuries. However, "custom ownership" has largely been interpreted in a Western sense of individual ownership, rather than the Melanesian sense of communal ownership of land (Regenvanu 2008; Nari 2000). This has led to a recent increase in the "sale" (actually long-term leases typically of 75 years) of customary lands by individuals to foreign investors for development and speculation purposes, often without consent of others with *bona fide* traditional vested interests.

Because most such land has been coastal, and "regard for statutory requirements for physical planning, foreshore development and preliminary environmental impact assessments were routinely being ignored" (Regenvanu 2008), environmental impacts have become increasingly apparent. These include erosion, sedimentation and the destruction of critically important fisheries habitats, including estuaries, mangroves, coral reefs, and seagrass meadows. These impacts adversely affect fisheries, tourism, livelihoods, and natural barriers to storms and sea level rise, as well as the future options for human development from these important resources. Owing to their downstream effects, such impacts in coastal environments also undermine the value and effectiveness of traditional, closed fishing areas still commonly found in Vanuatu under CMT systems (Johannes and Hickey 2004; Hickey 2007), as well as MPAs that are increasingly promoted in the Pacific to conserve marine resources (Ruddle and Hickey 2008).

Vanuatu has a strong heritage of managing resources through CMT and a combination of traditional ecological knowledge (TEK), beliefs and practices that include privileged user's rights, species specific prohibitions, seasonal closures, food avoidance, gear restrictions, behavioral prohibitions, and spatial-temporal refugia (Hickey 2006, 2007). Vanuatu's Department of Fisheries actively supports customary practices and recognizes CMT as a viable, decentralized system of resource management that fosters a sense of responsibility among communities to manage their own resources well. Traditional village leaders also continue to view the management of resources under their tenure as their traditional responsibility, and one that draws upon pre-existing, restorative community-based systems of dispute resolution.

Communities and their leaders also took up the role of monitoring and enforcing national regulations, once made aware of them and their underlying rationale (Johannes and Hickey 2004). This service saves the government considerable funds (that could be used towards improving education and health services, for example) from attempting to centrally manage resources throughout the archipelago.

Traditional resource management systems are also pre-adapted to the cultural milieu of Oceania, having been derived from centuries of observation and adaptive management approaches that are based on local cycles of abundance, tidal and metrological cycles, as well as local socio-cultural and eco-

nomic considerations (Ruddle and Hickey 2008). In fact, all of the Western strategies adopted by Western science in natural resource management are already found in traditional strategies already found throughout most of Oceania (Johannes 1978; Hickey 2006, 2007).

Many elders retain an impressive body of TEK, including resource specific spatial-temporal distribution, including for spawning migrations and aggregations, preferred habitats, traditional fishing calendars, environmental cues, linguistic skills, and other knowledge relevant for management. This knowledge and capacity should be mobilized into community-based nearshore reef management plans. Unfortunately, many donor driven projects often ignore pre-existing knowledge systems (Ruddle and Hickey 2008), which leads to their further marginalization and attrition. However, because many Pacific Island nations lack human resources and financial capacity, they are often obliged to accept Western-based approaches, in order to access donor funding. It is similar with agricultural projects that promote new crop production methods, including for example, donors' intentions of introducing oil palm production in Vanuatu (which relies extensively on pesticides and will not withstand hurricanes and so is destined to fail) (Weightman 1989).

Given the recent dramatic increase in imported food prices, it is increasingly important to maintain the wealth of TEK that has promoted household and social food security in the Pacific for thousands of years, while buffering impacts from global market fluctuations that are largely controlled and influenced by nations far from the Pacific. It is also widely acknowledged that the organic food produced in mixed gardens — which is typically found in Melanesia and other parts of Oceania — is far superior in nutritional value and general quality, compared with Western foods that rely on an assortment of chemicals in their production. Thaman (2008) also notes that the "combination of both species and genetic diversity of both wild and domesticated plants and animals makes traditional polycultural agricultural systems much more biodiverse and much more resilient than modern agriculture."

Additional value from nearshore areas comes in the form of coastal protection from hurricanes, storm surges and impacts from sea level rise. Nearshore coral reefs, mangroves and associated forests form natural barriers to erosion from these threats, and protect coastal areas where most Pacific cities, villages and infrastructure are located. This physical protection from seasonal threats and global warming and sea level rise are additional reasons to ensure sustainable, non-destructive use of nearshore areas.

Nearshore fisheries remain critically important to virtually all islands of Vanuatu in promoting easily accessible household food and social security and diversification of livelihoods (including for revenue that may be used to pay for education and access to health facilities) (Gay 2008). Nearshore fisheries in Vanuatu continue to rely on a large body of TEK inherited by both men and women from their forebears for enhancing catches, as well as preparing, preserving and managing these resources (Hickey 2006, 2007).

Education

The promotion of universal education in development priorities such as MDGs often implies Western education, which typically lacks local context and the acknowledgement of Oceania's knowledge systems.

A fisherman uses his knowledge of fish and habitats to enhance his catch (Image: F. Hickey).

Today, the majority of young people in Vanuatu obtain most of their education from the formal education system, which, for secondary school, means boarding schools away from home islands. This also means that they no longer speak their own vernacular languages or continue to practice the knowledge systems of their forebears that produce household food and social security, and that underpin resource management systems. Formal education systems rarely include the management value of pre-existing systems of food production or resource management, but concentrate primarily on promoting Western models as presented in textbooks produced overseas. As a result, students generally leave the formal education system convinced that their TEK is of limited value, and so not worth maintaining or integrating into contemporary forms of management.

In addition, the wealth of vernacular languages found in Vanuatu and throughout Melanesia are rapidly eroding and disappearing (Lynch and Crowley 2001). The inherent relationship between environment and language is well acknowledged, as well as TEK, which is inherently found within language. However, very little attention is given to maintaining the linguistic wealth of Melanesia, or to stemming the rate of its loss. In Vanuatu, for example, the languages of education continue to be French and English — two colonial languages. With today's greater mobility and increased number of mixed marriages (of people from different cultural-linguistic groups), the transmission of vernacular languages naturally continues to decline.

The loss of value associated with TEK by youth could be easily remedied by incorporating it into the formal education system to promote its value to students today (along with the complementary value of Western or scientific knowledge). To further this objective, the Vanuatu Cultural Centre, in collaboration with Vanuatu's Ministry of Education and UNESCO-LINKS, has recently launched a programme to develop curriculum materials for primary schools, profiling the value and use of TEK within the traditional economy and resource management systems.

It is also important to recognize and support traditional systems of education that emphasize "learning by doing" outside of the classroom. Informal systems of transmitting TEK remain extant in many Oceanian societies, but receive little formal recognition or support. Youth, women's and church groups may be appropriate fora within which these systems could be re-vitalized. And given the broad range of cultural knowledge and practice found throughout Melanesia, it is also important to recognize "other ways of knowing" outside of the Western cosmological framework generally adopted by the formal education system.

Alternative measures of human development, well-being and life satisfaction

It is widely acknowledged that "human development" includes various dimensions that complement and go beyond a focus on "basic income". Various definitions of human development include "a process of enlarging peoples choices and freedom" (Sen 2000), and "human flourishing in its fullest sense — in matters public and private, economic and social, and political and spiritual" (Alkire 2002).

A number of other human development measures have been developed in addition to HDI and MDGs to expand and include or emphasize different measures of human development. These include, for example, Bhutan's gross national happiness (GNH) index, which seeks to balance Western-style development with Bhutan's own value systems based on Buddhist principles. The four pillars of GNH are the promotion of equitable and sustainable socioeconomic development, the preservation and promotion of cultural values, conservation of the natural environment, and the establishment of good governance.

Given Melanesia's unique characteristics of high cultural diversity, high proportion of customary land/reef tenure, considerable intangible heritage, and actively practiced traditional economies, the Pacific Islands region should work toward developing a unique system of measuring development that more accurately reflects the social capital and value systems that maintain its cultural diversity, identity, economic self-reliance and resilience. This is important so that Oceania's development will not be informed or driven by what are widely accepted as inadequate or flawed measures of human development that miss much of the value of Pacific societies, including life satisfaction, well-being, productivity and quality of life.

To further this objective, the Vanuatu Cultural Centre submitted a concept paper to the last meeting of the Melanesian Spearhead Group, which voted to endorse the concept of researching the potential to develop Melanesian-specific human development measures. Funding has been secured to hold a workshop that will include representatives from throughout Melanesia and other countries already developing alternative measures (e.g. HPI, as well as from the United Nations Development Programme, the Secretariat of the United Nations Permanent Forum on Indigenous Peoples (which has been advocating for development of such indicators), the Tebtebba Foundation of Ethiopia, and the International Indian Treaty Council. The workshop will convene in 2009 to discuss these concepts, and will be a first step towards developing alternative meas-

ures for Melanesia, which will be more appropriate for guiding development in a sustainable way.

Conclusion

It is critical that global development priorities such as MDGs are implemented within the existing socio-cultural context of Oceania. This includes special recognition of the traditional economy, customary land and marine tenure and social currency systems, TEK, and other forms of intangible cultural heritage that support human development but are not captured by conventional measures such as GDP or HDI.

These pre-existing knowledge and social currency systems need also be included in formal education systems, in order for them to contribute sustainably to economic and human development, and not undermine the very values and knowledge systems that provide economic self-reliance and resilience as well as cultural identity within Oceania. Thorough consultation with community and traditional leaders and government personnel regarding the most appropriate ways to support these knowledge systems and in their introduction to the formal education system would assist towards this end.

Women's role in fisheries, particularly nearshore fisheries, need also to be better understood and acknowledged, especially with regard to their contribution to household food security and human development. Efforts to support the empowerment of women and promote gender equity should go hand-in-hand with this. Women's gender-specific TEK and management insights should be highly-valued for improving management of marine resources. Female fisheries officers trained in social sciences and the value of TEK would help advance these objectives.

Nutritious fresh fish from the reef for lunch (Image: F. Hickey).

It should also be recognized that fisheries, despite their limited contribution to GDP (acknowledging that it is largely under-estimated), remain central for many coastal and inland communities as a regular source of organic nutritious animal protein, and for the furtherance of human development through income generating options. To better understand and acknowledge the dynamics of fisheries' contribution to traditional economies and human development, it remains paramount that donors support the refinement of methods of censusing, sampling and estimating nearshore and freshwater fisheries catches and to support options for adding value to expand human development opportunities. Updated censuses would assist by providing accurate estimates of nearshore catches in light of the ongoing introduction of modern fishing gear, high population growth, continued monetization of marine resources, and an increasingly cash-based economy in many rural areas. National fisheries officers should work closely with statistics department officers in developing these refinements. Refined methods of estimating nearshore contributions to household food and social security will also assist in monitoring fisheries production as an appropriate proxy and useful indicator of human development for rural areas.

Globalization carries attendant risks as reflected in the current world financial crisis and economic downturn. These events should prompt regional organizations, donors, governments, and individuals to reflect on the value of the pre-existing and long-proven traditional economy that has provided food and social security in Oceania for thousands of years. Greater recognition of its self-reliant nature, wealth of pre-adapted TEK to the socio-cultural context of Oceania as well as genetic diversity needs be promoted. Strengthening the social currency and fabric of island societies has numerous other benefits, including stronger local governance and, in turn, better local land, marine tenure and resource management systems. It could be said that the traditional economy is the best suited livelihood development model to underpin the rural economies and maintain the Pacific way into the future.

Acknowledgments

Sincere thanks to Mr Pita Toa from the Vanuatu National Statistics Office, along with Vanuatu Cultural Centre personnel MP Ralph Regenvanu, Mr Joel Simo, Mr Noe Saksak, and Mrs Sue Baereleo, for their assistance in preparing this article.

References

Adams W.M. 2006. The future of sustainability: Re-thinking environment and development in the twenty-first century. Report of the IUCN Renowned Thinkers Meeting. Zurich, Switzerland: IUCN. `

ADB. 2003. Priorities of the people. Asian Development Bank, Manila, Philippines

Alkire S. 2002. Dimensions of human development. World Development 30:181–205.

Beazely P. and Mullin B. 2006. Vanuatu economic opportunities. Fact-finding mission (AusAID and NZAID), Blackdown Beaminster, UK, and St. Lucia, Queensland. Peter Bazeley Development Consulting and Uniquest Pty, University of Queensland.

Crocombe R. (ed). 1987. Land tenure in the Pacific. Suva, Fiji: University of the South Pacific.

Dalzell P., Adams T.J.H. and Polunin N.V.C. 1996. Coastal fisheries in the Pacific Islands. Oceanography and Marine Biology: An Annual Review 34:395–531.

Department of Fisheries. 2007. Annual report – 2007. Port Vila, Republic of Vanuatu.

Foale S.J. and Manele B. 2004. Social and political barriers to the use of marine protected areas for conservation and fishery management in Melanesia. Asia Pacific Viewpoint 45(3):373–386.

Gay D. 2008 (ed). Vanuatu diagnostic trade integration study. Department of Trade, Industry and Investment, Port Vila, Vanuatu.

Gillett R. and Lightfoot C. 2001. The contribution of fisheries to the economies of Pacific Island countries. Pacific Studies Series. Manila, Philippines: ADB.

Hickey F.R. 2006. Traditional marine resource management in Vanuatu: Acknowledging, supporting and strengthening indigenous management systems. SPC Traditional Marine Resource Management and Knowledge Information Bulletin 20:11–23.

Hickey F.R. 2007. Traditional marine resource management in Vanuatu: World views in transformation. p 147–168. In: Haggan N., Neis B. and Baird I.G. (eds). Coastal Management. Source 4. UNESCO.

Huffman K.W. 1996. Trading, cultural exchange and copyright: Important aspects of Vanuatu Arts. p. 182–194. In: Bonnemaison J., Kaufmann C., Huffman K. and Tryon D. (eds). Arts of Vanuatu. NSW, Australia: Crawford House Publishing Pty Ltd.

Johannes R.E. 1978. Traditional marine conservation methods in Oceania and their demise. Annual Review of Ecology and Systematics 9:349–364.

Johannes R.E. and Hickey F.R. 2004. Evolution of village-based marine resource management in Vanuatu between 1993 and 2001. Coastal region and small island papers 15. Paris: UNESCO.

Kronen M. and Vunisea A. 2007. Women never hunt – but fish: Highlighting equality for women in policy formulation and strategic planning in the coastal fisheries sector in the Pacific Island countries. SPC Women in Fisheries Information Bulletin 17:3–15.

Lynch J. and Crowley T. 2001. Languages of Vanuatu, a new survey and bibliography. Pacific Linguistics, Research School of Pacific and Asian Studies. Canberra, Australia: The Australian National University.

Nari R. 2000. Land tenure and resource management: A major challenge in Vanuatu. Pacific Economic Bulletin 15(2):170–174.

National Statistics Office. 2006. Preliminary report: Agriculture census 2006. Port Vila, Vanuatu.

National Statistics Office. 2007. Preliminary report. Agriculture census 2007. Port Vila, Vanuatu.

National Statistics Office. 2008. National accounts of Vanuatu 2007. Port Vila, Vanuatu.

Novaczek I. and Mitchell J. 2004 Constructing realities: documenting women's fisheries in the Pacific Islands. p. 15-20. In: Choo, P.S., Hall S.J., Williams, M.J., (eds). Global Symposium on Gender and Fisheries: Seventh Asian Fisheries Forum, 1–2 December 2004, Penang, Malaysia. WorldFish Center, Penang, Malaysia. 174 p.

Nowak B.S. 2008. Environmental degradation and its gendered impact on coastal livelihoods options among Btsisi' households of Peninsular Malaysia. Development 51:186–192.

Pacific Pulse. 2008. The weekly newsletter of South Pacific Travel.

Regenvanu R. 2008. Issues with land reform in Vanuatu. Journal of South Pacific Law 12 (1):63–67.

Ruddle K. and Hickey F.R. 2008. Environment, Development and Sustainability 10(5):565–589.
Sen A. 2000. Development as freedom. Oxford: Oxford University Press.

Tarisesei J., and Novaczek I. 2005. Gender, generational perceptions and community fisheries management in Lelepa, North Efate, Vanuatu. p. 187–208. In: Novaczek I., Mitchell J. and Veitayaki J. (eds). Pacific Voices – Equity and sustainability in Pacific Island Fisheries. Institute of Pacific Studies, University of the South Pacific.

Thaman R.R. 2008. Pacific Island agrobiodiversity and ethnobiodiversity: A foundation for sustainable Pacific Island life. p. 102–110. Biodiversity: Journal of Life on Earth 9(1 & 2): 102–110.

Van Trease H. 1987. The politics of land in Vanuatu. University of the South Pacific, Institute of Pacific Studies. Suva, Fiji Islands.

Weightman B. 1989. Agriculture in Vanuatu, a historical view. Portsmouth, UK: Grosvenor Press.

Williams M.J. 2008. Why look at fisheries through a gender lens? Development 51:180–185.

Zeller D., Booth S. and Pauly D. 2005. Fisheries contributions to GDP: Underestimating small-scale fisheries in the Pacific. Working Paper # 2005-5. Fisheries Centre. University of British Columbia, Vancouver, Canada.

The role of social capital in a common property resource system in coastal areas: A case study of community-based coastal resource management in Fiji[1]

Yae Sano[2]

Abstract

This article analyses how bonding and bridging social capital function in community-based coastal resource management as common-pool resource management in Fiji. Strong bonds among villagers help disseminate information and knowledge in the community. A kinship-based village structure contributes to a high degree of accountability among those villagers nominated as fish wardens, who are responsible for monitoring marine resources. Increased cooperation between non-governmental organisations (NGOs) and local villages has encouraged "weak ties", which allows villagers to gain access to new knowledge and information on coastal resource management. When a non-governmental organisation adopted an "individual participatory approach", by allowing individual villagers to participate in management, a project was more successful than hitherto in incorporating resource users' knowledge and experience into management planning. That resulted in a higher congruence between institutions and local conditions.

Introduction

Coastal resources are important for large numbers of Pacific Islanders. In particular, small-scale fishing, normally conducted between the shoreline and the outer reef slope, provides an essential source of income and animal protein (Gillett and Lightfoot 2001; King and Lambeth 2000; World Bank 1999). However, no consensus exists regarding the long-term sustainability of coastal resource use. Some studies demonstrate that in the South Pacific, coastal ecosystems and their resources are increasingly threatened from various sources (Huber and McGregor 2002; UNEP 1999; World Bank 1999), including both land- and ocean-based human activities.

Responding to the demand for the conservation of coastal resources in the Pacific Islands region, considerable funds and effort have been directed in recent decades at reducing pressure on coastal resources, and solving problems of their degradation. Simultaneously, the practice of coastal resource management has evolved. In particular, a major shift occurred from a centralised or "top-down" approach to resource management, to what is commonly called community-based or a "bottom-up" approach. This shift is clearly visible in the Pacific Islands, where halting and reversing the degradation of the coastal environment by working with local communities is now the norm in both government policy and international donor strategies (e.g. King and Lambeth 2000; LMMA 2003).

Social capital and common-pool resource management

This article summarises a doctoral study I conducted of the functions of social capital in community-based coastal resource management (CBCRM) in Fiji, where non-local organisations assist local residents in their management activities. The term "social capital" has gained increasing popularity among academics and practitioners, who view it as useful in delivering desirable outcomes in social and economic development. Based on a review of key literature on social capital (e.g. Coleman 1988; Côté and Healy 2001; Fukuyama 1995; Harpham et al. 2002; Lin 2001; Putnam 2000; Putnam et al. 1993; Woolcock 1998), social capital in this study is defined as a set of values, such as the norms of reciprocity, and social relations embedded in the social structure of a society, that enable people to act collectively to achieve their desired goals. The most important point is that by developing social capital, a group of people can build trust, which affects the degree of their collaborative actions.

Theories of common-pool resources (CPR) are particularly important in the study of the governance of

1. This study was conducted as part of my doctoral research at the Crawford School of Economics and Government, Australian National University.
2. College of Asia Pacific Studies, Ritsumeikan Asia Pacific University, 1-1 Jumonjibaru, Beppu, Oita 874-8577, Japan. Email: ysano@apu.ac.jp

natural resources, and they explain why social capital is necessary in CBCRM. The literature on "new institutionalism" demonstrates a general consensus that building institutions that empower local communities is a prerequisite for long-lasting resource management. This is because institutions reduce uncertainty by providing structure to management (North 1990) and by clarifying those actions that are permitted and those that are prohibited (Oakerson and Walker 1997). Further, institutions affect the way a community evolves over time because they affect people's choices by: 1) influencing the availability of information and resources, 2) shaping incentives, and 3) establishing the basic rules of social transactions (Nicholson 1993). As CPR researchers have argued (e.g. Ahn and Ostrom 2001; Ostrom 1990; Ostrom 1998a; Rudd 2000), a certain level of trust among resource users is necessary to sustain institutions. To avoid common problems caused by the two key elements of subtractability and excludability, long-lasting CPR use requires cooperation among users (Ostrom 1990); to some extent, users need to share norms and understand rules regarding resource use so as to maintain institutions.[3] As a result, it follows that social capital plays a critical role in CPR management.

To examine empirically how social capital functions in CBCRM as a case of CPR management with external interventions, the research reported on here focused on the two-dimensional nature of social capital, expressed by bonding and bridging capitals. *Bonding social capital* is defined as ties among somewhat homogenous groups, and represents social capital within the community, whereas *bridging social capital* is defined as ties across diverse social groups, and corresponds to the concept of social capital between the community and external organisations (Gittell and Vidal 1998; Putnam 2000: 22–23).

The concept of a two-dimensional nature of social capital is helpful in explaining the CBCRM situation in Fiji. Fijians themselves characterise village life as a source of their identity and a symbol of unity. These strong ties — or strong bonding social capital — have been an important factor in enabling Fijians to cooperate in maintaining an institution that is vital to protecting their resources, and in particular, the system of customary fishing grounds known as *qoliqoli*. On the other hand, as a response to the problem of resource degradation caused by unsustainable methods of resource use, NGOs have promoted CBCRM projects in Fijian villages. The theory underlying these projects is that of CPR, promoting self-governance by villagers. In doing so, NGOs empower community members by providing knowledge, skills and suggestions in order to revive traditional resource use practices, specifically a marine protected area (MPA) or *tabu*[4] (Veitayaki et al. 2001:1). In short, NGO projects aim to build bridging social capital in the context of CBCRM.

As a conservation tool for coastal resources, MPAs have been used throughout the Pacific with a community-based approach. In the case of Fiji, the Locally Managed Marine Areas (LMMA) Network has introduced locally managed versions of MPAs as a means of coastal conservation at the community level. The LMMA Network was launched in October 2000, and was formed by a group of marine conservation practitioners, such as communities, academics, NGOs, donors, and government agencies. An LMMA is defined as "the overall marine area being managed by the local community or resource-owning groups (or co-managed with outside assistance) (LMMA 2005:11). Although the site of an LMMA can vary widely in purpose and design, two aspects remain constant: 1) a well-defined or designated area, and 2) substantial involvement of communities and/or local governments in decision-making and implementation. Parts of LMMAs can be declared as a "full reserve" or a "species-specific no-take zone", depending on local conditions and conservation purposes.

Methods

Using an analytical framework built on the literature of CPR and social capital, I analysed how social capital both acts as a catalyst in CPR management, and influences the durability of CBCRM with intervention from external organisations such as NGOs. Since the challenge of CPR management is to get people to collaborate to maintain institutions, one way to measure "long-lasting CBCRM" is to examine: 1) whether resource users share a common understanding of the rules, and 2) whether they follow these rules.

3. Douglass North defines institutions as "the rules of the game in a society or, more informally, are the humanly devised constraints that shape human interactions." While state legislation is a kind of institution, institutions can also be informal: norms are similar to rules but are considered the informal standard among a group of specific individuals. It is important to note that institutions are different from "organisations" which are "groups of individuals bound together by some purpose to achieve objectives" North, D.C. 1990. Institutions, institutional change, and economic performance. New York: Cambridge University Press.
4. Tabu, originally practiced for social and spiritual purposes, is a temporary closure of part of qoliqoli or a prohibition on fishing for certain species. In particular, when a high chief dies, a 100-day tabu is often imposed on a certain part of qoliqoli as a sign of respect. In the context of community-based coastal resource management in Fiji, tabu means an MPA where people are not allowed to catch any marine creatures. The LMMA Network considers that LMMAs are different from MPAs because they are characterised by local ownership and/or control, whereas MPAs are typically designated by levels of management via a top-down approach. However, following the IUCN's broad definition, the term MPA is used here to describe LMMAs in Fiji

Numerous scholars (e.g. Bullen and Onyx 1998; Halpern 2005; Woolcock and Narayan 2000) have pointed out that the measurement of social capital is controversial. The forms of social capital are society-specific and diverse at the operational level. Indeed, they change over time. Therefore, the instruments for measurement must focus on a range of dimensions of social capital (Narayan and Cassidy 1999). This study follows previous studies that have attempted to measure social capital and socioeconomic outcomes across a number of rural villages in different developing countries (Grootaert et al. 2003; Narayan 1997; Narayan and Pritchett 1999). Based on those studies, the social capital indicator framework (Fig. 1) was used to examine bonding and bridging social capital in the context of CBCRM in Fiji.

The study sites are the districts of Cuvu and Wai, which are 2 of 21 districts within Nadroga/Navosa Province, on the southwest coast of Viti Levu Island. Both districts have worked on CBCRM projects with NGOs within the framework of the Fiji LMMA. Owing to their different proximity and access to the market economy, these two areas were expected to possess different characteristics that could be conceptualised as bonding and bridging social capital. On the other hand, the two areas had the following three characteristics in common: 1) they possess attributes of a CPR case under the Fijian customary marine tenure system; 2) residents have received support in their coastal management activities from such external organisations as NGOs, for MPA establishment; and 3) coastal management activities supported by external organisations, such as management planning, involve community participation.

The first study site is the Cuvu District,[5] located by the main highway and close to Sigatoka town. The tourism industry in and near the district provides employment for residents. Owing to these conditions, and consistent with those sociologists (Gilbert and Gugler 1982; Sandel 1984) who argue that a modernised community lacks shared values, it was expected that the communities of Cuvu District would possess a relatively low level of bonding social capital and a high level of bridging social capital. Since 1999, the Partners in Community Development in Fiji (PCDF), an NGO, has been actively involved in CBCRM in Cuvu.[6]

The second study site is Wai District, which has six villages, and is located in the western Nadroga/Navosa Province. Four of these villages, including the main village of Lomawai, are located along the coast, approximately 5 km away from the main highway. The other two are inland. Since 1999, the World Wide Fund for Nature (WWF) Fiji Programme has worked with residents of the villages of Wai on a community project for coastal resource management. Compared with Cuvu District, Wai District is remote, and it was expected that villagers would have a higher level of bonding social capital and lower level of bridging social capital.

Fieldwork for data collection was conducted over an eight-month period in 2003 and 2004. Fifty-three interviews were conducted with various respondents, including village leaders, traditional chiefs, elders, fish wardens, village women, NGO staff, government officials, and others. To acquire quantitative data, an individual survey was conducted

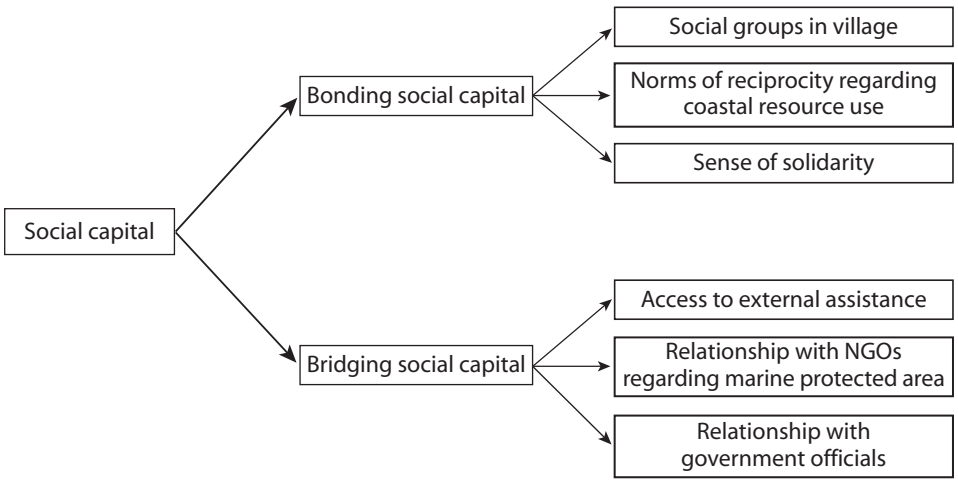

Figure 1. Social capital indicator framework in this study.

5. Cuvu District comprises seven coastal villages that traditionally share a customary fishing ground with the neighbouring village of the District of Tuva. Because of this historical relationship among the villages, an NGO, PCDF, has worked with all eight villages in a coastal management project since 1999 . Therefore, for the purpose of my research, the study site of Cuvu refers to the area that includes these eight villages.
6. Cuvu District and PCDF withdrew from the Fiji LMMA Network in 2004.

with 60 individuals in Cuvu and 62 individuals in Wai. In addition, Fijian government documents were reviewed for background information. Triangulation (Maxwell 1996; Patton 2002; Tashakkori and Teddlie 1998) allows a researcher to combine data and information collected through these multiple methods and to confirm whether they are accurate.

CBCRM institutions in Cuvu and Wai

The types of rules this study is most concerned with are those of resource boundaries and appropriation. Understanding boundaries is important for clarifying what is being managed, and for whom. In short, defining the boundaries of CPRs is the first step in any kind of collective action (Ostrom 1990). By reducing uncertainty as to who will benefit from management practices and who will pay the costs, clearly defined boundaries increase the chances of success. Two types of CPR boundaries exist in CBCRM cases in Fiji. These are the boundaries of *qoliqoli* and those of MPAs, used as the main tool in the conservation of resources in coastal areas. Figure 2 shows how these boundaries are defined on maps, based on an official map of *qoliqoli*.

Coastal waters and natural resources are shared by the State and Fijian people. Although this dual ownership system is complex and often misunderstood by the people (Lagibalavu 1994), villagers in Cuvu and Wai are well-informed on this issue, and clearly understand how property rights are assigned. Residents of both districts learned of the property rights arrangement regarding their fishing activities in the *qoliqoli* as part of NGO-assisted coastal projects. All villagers also possess a common understanding of MPA boundaries.

Residents of Cuvu and Wai districts also have a good understanding of appropriation rules. Every villager knows that all fishing is prohibited in their MPA, as are certain types of fishing gear. It seems that although villagers lack accurate knowledge regarding mesh size restricted by the Fiji Fisheries Act, they understand that the use of fine mesh nets is prohibited.

To examine the sustainability of CBCRM as CPR management, an important question is whether resource users follow the rules. If the number of residents following the rules is small, then the institution is unlikely to be stable. Despite rule compliance being essential for enduring resource management, neither of the NGOs had collected data on whether or not villagers actually followed local rules. Given the difficulties of directly measuring rule compliance, the individual questionnaire survey asked respondents their *perceptions* of rule compliance in their particular village.

Figure 3 shows villagers' perceptions of their compliance with MPA rules in their waters. It can be seen that only 40.4% of Wai residents "always follow", or, "follow most of the time", the fishing rules. Fifty-six percent answered that either "some don't follow" or "most of us don't follow" the rules. In contrast, Cuvu residents showed better compliance with MPA rules: 72% of Cuvu respondents answered "we all follow" or "most of the time we follow" MPA rules. However, other interviewees revealed that some people broke appropriation rules. Those rule breakers are both people from outside of the villages and the villagers themselves. Interviewees identified reasons for rule breaking, including a lack of awareness of the importance

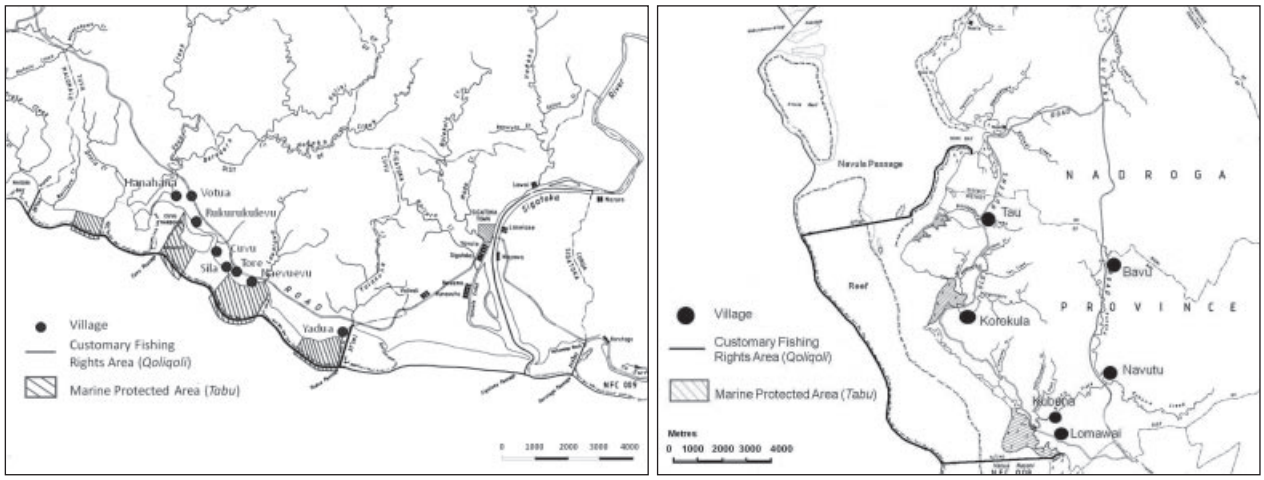

Figure 2. *Qoliqoli* and MPAs in Cuvu and Wai.[7]

7. The original *qoliqoli* maps produced by the Ministry of Fijian Affairs were modified by the author.

of conservation and a decreased respect for other residents by the younger generation.

Bonding social capital in Cuvu and Wai districts

The theoretical literature (Fedderke et al. 1999) posits that bonding social capital helps the rationalisation of rules and norms within a group, by facilitating the flow of information that encourages members to conform. Fijian society places traditional obligations and demands on individuals, especially those living in villages, which has resulted in some dominant characteristics, including a sense of strong bonds that has implications for long-lasting CBCRM.

(a) Social groups in villages

Most social groups in both districts are church-related. This includes Sunday school for children, the youth group (Methodist fellowship), and women's and men's groups. Membership of these groups is open to all residents, and, other than gender and age, there is no special requirement to join a group. As a result, most people join one of these groups unless he/she belongs to a denomination other than the Methodist church. All of these groups regularly hold weekly meetings.

In addition to church-based social groups, villagers identified some social groups in the villages of both districts. Mothers of village children join the mothers' club at a primary school, to help with school activities. Male elders form an elders' group, but female elders remain in the women's group. A rugby team has been organised exclusively for men in Cuvu, but there is no sporting group or team for women. Villagers say that this reflects better job availability for women in the tourism sector near the villages. One of the villages in Cuvu (Rukurukulevu) also has a *meke* group of only young residents that occasionally performs *meke*, a traditional Fijian dance, for tourists in nearby resorts. Apart from the elders' group, no group is involved in CBCRM-related activities. Since elders' opinions are highly respected in village life, decisions made in their meetings may affect CBCRM-related activities.

(b) Norms of reciprocity regarding coastal resource use

Studies suggest that Fijians generally have strong kinship-based ties, which foster reciprocal relationships (Frazer 1973; Nayacakalou 1978; Ravuvu 1983). Fijians seem to commonly recognise the presence of high levels of reciprocity, and all interviewees emphasised how strong their kinship ties are, and how they help each other in daily life. In formal and informal conversation, many respondents often mentioned the significance of family and their responsibility to other family members. Further, Fijians recognise a high degree of reciprocity, even between different clans or tribes.

To examine reciprocal relationships among villagers in relation to marine resource use, the survey asked participants 1) what they do when they borrow fishing gear, and 2) what they do when they have extra fish in their catch. (Table 1 shows whether residents borrow fishing gear from other residents, and Table 2 shows what obligations they have for the borrowed fishing gear.) In Cuvu District, 24 out of 59 respondents (40.1%) answered that they borrowed fishing equipment. For men, 60% of respondents answered that they borrowed fishing gear, whereas only 26.5% of women did so. Although most women go fishing, many do not use equipment, since they mainly reef glean. Thus, the ratio of women who need to borrow fishing gear is low relative to men.

Among those who answered that they borrowed fishing gear, 75% gave part of their catch to the gear owner. Cuvu villagers explained how reciprocal relationships worked, and all emphasised that they did not pay money among themselves: "When we come back [from fishing], and if we got a lot of fish, we have to give part of the catch to the net owner, so that they can give [lend] a net to you every time you ask, otherwise very bad. … People never pay in our village. You just give some fish when you come back, because we are all like cousins".

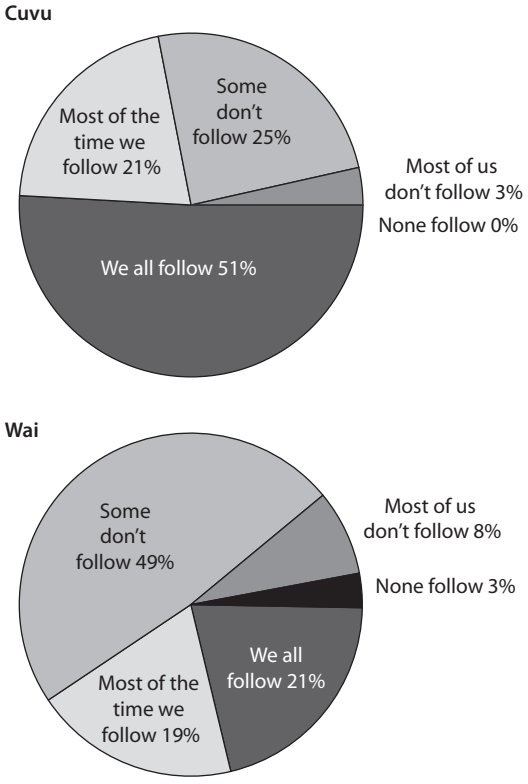

Figure 3. Compliance with MPA rules ("Would you say that fishing rules in the village waters are followed by the residents?") (Cuvu: n=57, Wai: n=62).

In Wai District, women borrow fishing gear from others more often than men do. Whereas 43.3% of female respondents answered that they borrowed fishing gear, 66.7% of males owned fishing gear and did not borrow equipment from others. Since many residents of Wai depend on fishing for their income and because fishing equipment is important, more people own their own gear than do residents of Cuvu. This applies particularly to males because they need to use relatively large nets and a boat to catch enough fish to sell.

In contrast to those in Cuvu District, three out of nine Wai male respondents who borrow equipment from others, stated that they pay money to the owner. Villagers explained that men sometimes borrowed a motorboat and the money they paid to the owner was for the cost of fuel, rather than for the use of the boat. Females do not usually pay for borrowed fishing gear. Although the sample size may not be large enough to draw any definite conclusions, 13 out of 14 female respondents (92.9 %) who borrow fishing gear from others reported giving part of the fish catch to the owner. Although none of the female respondents answered that they pay money, informal interviews revealed that they usually pay USD 0.58[8] per person per day for fuel when they use a boat for fishing.

Table 3 shows how villagers distribute their excess catch. Residents of Cuvu do not sell excess fish, except for in a few cases, such as sea cucumbers. Instead, most respondents (86.4%) give the excess to their relatives, who then share it among their other family members.

Like Cuvu, residents of Wai also reciprocate, by sharing fish they catch with others. For example, when I visited the villages, my host family received complementary fish from a cousin and other relatives and served it for her. When there was a ceremony to mark the 100 days after the death of my host mother's brother, relatives and neighbours provided a feast and shared the cost. The family would do the same for relatives and neighbours on future special occasions. However, in everyday life, fishing is an important source of income for Wai villagers. After putting aside fish for their own family, most respondents (75.5%) either sell their catch to middle persons in the village or in the town markets.

(c) Sense of solidarity among villagers

To examine residents' sense of solidarity, respondents were asked who they thought would act to deal with a situation in which there was a sudden decline in local fish catch. Nearly 83% of respondents of both districts answered that they would collectively solve the problem, although different levels of action were suggested (Table 4). In Cuvu, nearly half (48.3%) responded that the entire district would work together to solve the problem, whereas about one-third (32.8%) thought the entire village would work together.

Interviews also revealed that Cuvu residents generally consider solidarity at the district level to be important for MPA management, although some villages of Cuvu claim nested property rights at the village level (Sano in press). The following opinion reflects the villagers' attitude that unity leads them to better ideas and solutions in resource management: "If every village does conservation individually, then there could be problems. But if we have the whole district work together, anybody fishes in the area work together, conservation will become stronger, because everyone will respect the MPA ideas."

In Wai, the ratio of people who answered that they would collectively solve the problem was lower. While 30.5% of respondents chose the village level as the level where problem solving actually occurs, 16.9% chose the district. In addition, 22% answered that all village leaders work together. One notable finding was that 23.7% of respondents in Wai answered that the NGO would be able to deal with the problem, a far higher percentage of respondents than in Cuvu (1.7%). Although it is difficult to draw a definite conclusion, this suggests that Wai residents share a common belief that someone else would solve their problems.

Bridging social capital in Cuvu and Wai districts

Whereas bonding social capital is strong social ties within a community, bridging social capital is "weak ties", which can provide a group with information, opportunities and technology that the group does not possess. Information flows can be facilitated by bridging social capital because of enhanced transparency and reduced transaction costs. Granovetter (1973) argues that less intense relationships with others are a source of strength because they provide access to new information or other kinds of resources unavailable to those locked into highly dense, self-contained networks.

(a) Access to external assistance

Neither of the two districts has received large-scale development projects. They have obtained support from NGOs only for building small-scale infrastructure and mangrove planting, in addition to regular

8. 1 Fijian dollar = 0.58 US dollar

Table 1. Use of borrowed fishing gear.

	Cuvu District			Wai District		
	Male	Female	Total	Male	Female	Total
Use borrowed fishing gear	15 (60.0%)	9 (26.5%)	24 (40.1%)	9 (33.3%)	13 (43.3%)	22 (38.6%)
Don't use borrowed fishing gear	10 (40.0%)	25 (73.5%)	35 (59.3%)	18 (66.7%)	17 (56.7%)	35 (61.4%)

Table 2. Obligation for borrowed fishing gear.

	Cuvu District			Wai District		
	Male	Female	Total	Male	Female	Total
No obligation	5 (33.3%)	1 (11.1%)	6 (25.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Pay money	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (33.3%)	1 (7.1%)	4 (17.4%)
Give part of fish catch	10 (66.7%)	8 (88.9%)	18 (75.0%)	6 (66.7%)	13 (92.9%)	19 (82.6%)
Total	15	9	24	9	14	23

Table 3. Use of extra fish in catch.

	Cuvu District			Wai District		
	Male	Female	Total	Male	Female	Total
Sell in village	1 (4.0%)	1 (2.9%)	2 (3.4%)	17 (63.0%)	12 (40.0%)	29 (50.9%)
Barter with other residents	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.7%)	0 (0.0%)	1 (1.8%)
Give to chief	2 (8.0%)	1 (2.9%)	3 (5.1%)	1 (3.7%)	1 (3.3%)	2 (3.5%)
Give to relatives	22 (88.0%)	29 (85.3%)	51 (86.4%)	5 (18.5%)	9 (30.0%)	14 (24.6%)
Give to other residents	0 (0.0%)	1 (2.9%)	1 (1.7%)	0 (0.0%)	1 (3.3%)	1 (1.8%)
Sell in market	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (7.4%)	7 (23.3%)	9 (15.8%)
Other	0 (0.0%)	2 (5.9%)	2 (3.4%)	1 (3.7%)	0 (0.0%)	1 (1.8%)
Total	25	34	59	27	30	57

Table 4. How to solve a resource problem ("If there were a sudden decline in fish catch in village waters, who do you think would act to deal with the situation?")

	Cuvu	Wai
Each household would deal with the problem individually	1 (1.7%)	1 (1.7%)
Members of sub-clan among themselves	4 (6.9%)	0 (3.4%)
The entire village working together	19 (32.8%)	18 (30.5%)
All village leaders working together	4 (6.9%)	13 (22%)
The entire district work together	28 (48.3%)	10 (16.9%)
NGO	1 (1.7%)	14 (23.7%)
Government official	1 (1.7%)	3 (5.1%)
Total	58	59

support from national government subsidies for the installation of flush toilets. Wai District received the attention of academic researchers in their development-related project.[9] Development projects implemented by outside organisations in the two districts are summarised in Table 5, which shows that Wai had a few more than Cuvu. However, a qualitative analysis suggests that these were small in scale and short in duration. Therefore, I assumed that the two districts possess similar levels of bridging social capital in terms of access to external assistance in village development.

(b) Relationship with NGOs regarding MPAs

The CBCRM projects in Cuvu and Wai both started in 1999 with assistance from NGOs, namely PCDF and WWF. Interviews with officers of these two NGOs revealed that both "emphasised a bottom-up approach in promoting the conservation of coastal resources". The NGOs take residents' participation and initiative seriously, as stated by two officers: "Communities themselves are involved in decision making. All issues must come up from the community. It's a community management plan. That's why we conduct community workshops and we bring all stakeholders in the workshops, fisheries, environment, forestry and agriculture," remarked one NGO officer. "We didn't make the *tabu* [MPA]. That was the initiative of the people. We facilitated talks in the villages and everybody agreed to it," stated another NGO officer.

Although both NGOs took participatory approaches, opportunities given to villagers varied between the two districts. To measure the degree of villagers' participation in MPA planning, respondents were asked how many times they attended a workshop or training on MPA. Table 6 shows that workshop attendance was different between the districts ($P<0.05$, t-test), and demonstrates that Wai villagers had a relatively limited opportunity to attend workshops related to MPA management.

Table 6. Difference in number of attendance in workshops between districts

Mean		*T*-value	*P*-value
Cuvu	Wai		
2.47	1.98	2.516	.013

Cuvu: n=55, Wai: n=60

It seems that the lower levels of participation in Wai resulted in part from how WWF planned workshops. Management-related workshops organised by WWF were held in one of the villages of Wai, and some residents selected from other villages travelled to join the workshops. As one respondent stated, "Since 1999, March this year [2004] was the first time they [WWF] went to all the villages one by one. Before, WWF paid the participants the fare to come to this village...Five people were chosen from each village. They chose the community reps from each village, *Turaga ni Koro* [village leader], maybe one or two women, and two youth from each village".

It is noteworthy that villagers' perceptions of NGO presence also seem to differ between the two districts. In the survey, 19.4% of Wai respondents answered that the NGO made decisions regarding fishing rules (Fig. 4). In contrast, less people in Cuvu answered that the NGO did so (6.7%). This difference might have resulted from the different participation processes of each project. Cuvu residents had more chances to attend management planning workshops because they were held in five different villages in the initial stage of the project. Further, more frequent participation in the planning stage might have promoted villagers' sense of

Table 5. Projects in Cuvu District and Wai District supported by outside organisations.

	Title	Target group	Year	Sponsor/implementing organisation
Wai	Installation of tanks for drinking water	Lomawai and Kubuna villages	1996	OISCA
	GIS as a Planning Support Tool for Community Integrated Tourism Development Project	Representatives from all villages	2004 (2 days)	Department of Tourism and Hospitality, University of the South Pacific
	Mangrove planting	Lomawai Village	2004 (1 day)	Peace International Association
Cuvu	Children's Forest Programme	Students of Cuvu District school	1993	OISCA
	Mangrove planting	Yadua and Tore villages	1995	OISCA

9. "GIS as a Planning Support Tool for Community Integrated Tourism Development Project" was implemented by the Department of Tourism and Hospitality of the University of the South Pacific.

project ownership and familiarity with the NGO. In other words, the degree of participation in CBCRM projects might depend on how bridging social capital of villages is constructed. Cuvu residents were more likely to become involved in CBCRM than Wai residents.

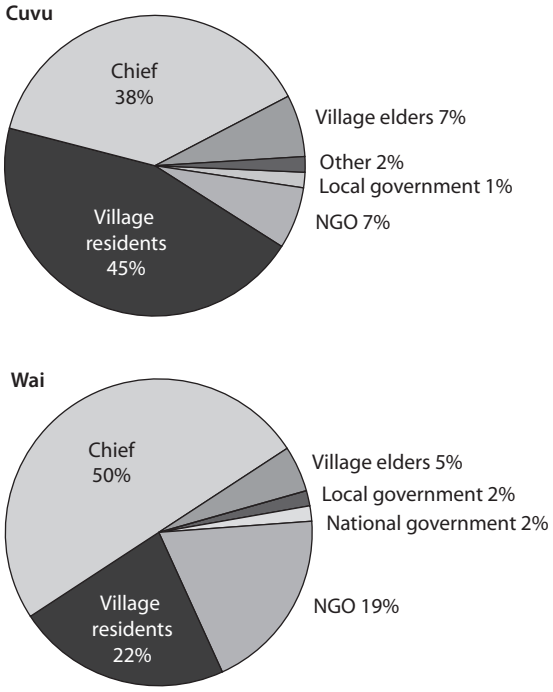

Figure 4. Decision-makers ("Who makes decisions about changes to the fishing rules?") (Cuvu: n = 60, Wai: n = 62)

(c) Relationship with government officials

For NGO officers, collaboration with government is the key to implementing long-lasting resource management. During project preparation, both NGOs (PCDF and WWF), first made contact with the districts through the provincial office. Generally, such local branches of government agencies such as the provincial office, Fisheries Department, Forestry Department and Environment Department, are invited to village workshops because NGOs consider that building a bridge between villages and government agencies is important for the sustainability of CBCRM. As a PCDF Officer explained: "When we hold workshops in the villages, we invite the officers to present … We invite representatives from the Fisheries and the Environment Departments so that we can have the integrated approach. This is necessary, because once we will pull out from the project, the government will be still responsible for the project." However, it seems that villagers do not always acknowledge government support in their CBCRM activities. Only 1.7% of Cuvu respondents and 5.1% of Wai respondents answered that government officials would act to deal with the situation if there were a sudden decline in the fish catch in their village waters. No respondent stated that government was helpful in CBCRM. In fact, owing to a lack of funding and expertise at the provincial office, the government is not able to implement its own projects on resource management, although it recognises the importance of resource management.

To summarise, the bridging social capital, operationalised as the formal and informal relations between the villages of the two districts and the provincial government, is weak. Owing to a lack of manpower and budget, it is apparently difficult for provincial officers to visit every district, as instructed by the government. In particular, neither budget nor staff in the provincial government is dedicated to CBCRM, although the officer is aware of its importance. Instead, the provincial government intends to facilitate NGO involvement in CBCRM, thus building bridging social capital in villages.

Functions of bonding social capitals in CBCRM in Cuvu and Wai districts

The major theoretical functions of bonding social capital are first to facilitate common understanding and knowledge among resource users, because strong ties among villagers make knowledge diffusion easier, and second to make rule enforcement easier because reciprocity can be used in social dilemmas involving an assessment of the likelihood that others are conditional cooperators.

Drawing on material obtained during fieldwork, I argue that, in the case of CBCRM in Cuvu and Wai districts, bonding social capital plays two critical roles to make institutions work. These are promotion of common understanding and shared knowledge, and better rule enforcement.

(a) Promotion of common understanding and shared knowledge

Bonding social capital in the context of CBCRM facilitates the diffusion of knowledge and information among villagers. Owing to strong bonds, information and knowledge are disseminated smoothly among villagers. An example of this was found in well-organised village meetings. In each village of Cuvu District, meetings are held every two weeks, and all adults attend. According to the survey, 83.3% of respondents in Cuvu answered that when there is any change in fishing rules, they obtain information in village meetings (Fig. 5). If necessary, additional meetings are held. Although because of both custom and hierarchy, women and youth are normally quiet during meetings, all villagers hear about both the content and the process through which decisions are

made. Even when a person is absent, it is not difficult for him/her to receive information as a result of the high level of bonding social capital based on the close relationships among family and relatives. In addition, all respondents answered that the village leader is responsible for information dissemination. Since villages in the two districts are relatively small, residents are able to share information.

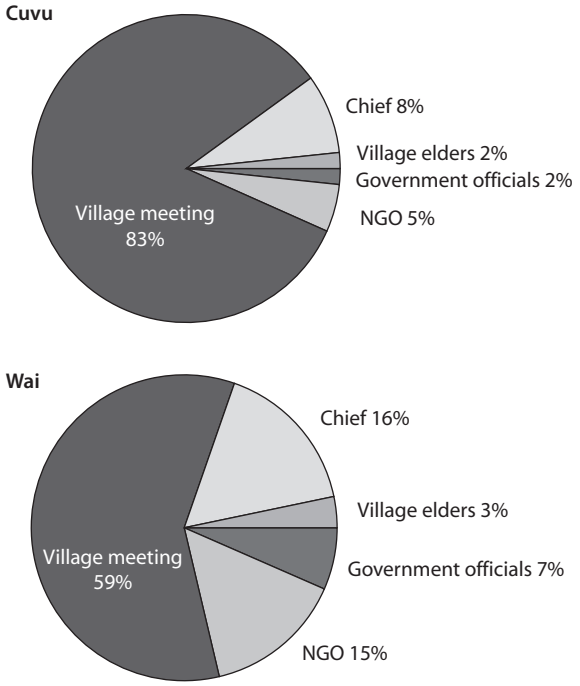

Figure 5. Information source in village (Cuvu: n = 60, Wai: n = 61)

Like Cuvu, the villages of Wai District hold meetings in their community hall every other Monday. All adults must attend. Although compared with Cuvu, more respondents chose an NGO and the chief as an information source, 59% of Wai respondents answered that they would know in the village meeting if there were any change in the fishing rules. Wai village leaders suggest that they have strong connections with other leaders, so the sharing of information among them is easy. Important information from other villages, such as MPA openings, is then passed to village members in the Monday meeting and shared. One villager emphasised the significance of information sharing to make the MPA effective: "It's better to tell people where *tabu* is so that no one will go in. In each village, Turaga ni Koro [village leader] has to go through the process [of information sharing] to tell people that they can just go fishing in the village water, but they cannot go in the *tabu* area." Better rule enforcement — Provision of low-cost adjudication

Rule enforcement is necessary for long-term CPR management (Gibson et al. 2005), and bonding social capital is important in the provision of appropriate monitoring and sanctions. In the districts of Cuvu and Wai, fish wardens, selected from villagers for the purpose of monitoring, are accountable to other villagers for keeping an eye on resource conditions and user behaviour. Villagers know the fish wardens personally, as they are locally chosen from the community and understand their roles in CBCRM. As Ostrom argues (2000:151), trust based on strong bonds among fish wardens is a necessary condition for enduring CPR management. The result is that the rest of the village can be motivated to cooperate, without fear that they are being taken advantage of.

Villagers' sense of reciprocal obligations also helps keep sanctions graduated. Bonds based on kinship allow for local sanctions to be just a simple warning, because the level of trust and reciprocity among villagers is high and mistakes tend to be forgiven. In economic terms, the cost for rule enforcement remains low. As Ostrom (1990) argues, low-cost rule enforcement is a necessary condition for long-lasting CPR management.

Functions of bridging social capital in CBCRM in Cuvu and Wai districts

The literature (e.g. Fedderke et al. 1999; Grafton 2005) suggests that the theoretical functions of bridging social capital are three-fold. Bridging social capital promotes stakeholders' understanding of CBCRM and its rules by: 1) bringing new knowledge and technology from external groups, 2) building links across neighbouring communities and other external stakeholder, and 3) organising consistent rules in multiple layers of nested enterprises.

(a) Villagers' understanding and knowledge of CBCRM

Bridging social capital facilitated access to and the creation of knowledge of MPA in villages. Every villager in the two districts stated that the idea of establishing an MPA was brought by NGOs. Although NGOs gave credit to villagers themselves for starting the conservation activities in their villages, it is apparent that the knowledge and technology were transmitted from outside through NGOs' village activities. Although an officer of the NGO admitted that making an MPA by enclosing only a small portion of *qoliqoli* is not effective enough for biodiversity conservation, bridging social capital certainly contributed to the creation of knowledge in villages for residents to take action in the management of natural resources.

In Cuvu District bridging social capital seems to have had clearer effects. Through the workshops organised by PCDF villagers developed a recog-

nition that conservation is important for sustaining their life. NGOs recognise that knowledge transmission from them to villagers is significant for long-lasting resource management. Officers of both NGOs expect villagers to act as resource managers in their own village. Following Clark's (Clark 1995:310) argument that resource users can be the day-to-day managers in implementing resource management, NGOs consider that assisting villagers to organise themselves as monitors of resource uses is an effective strategy. In addition, the WWF officer said that villagers who are trained in their project are expected to disseminate their knowledge and experience to other villages, in order to extend proper management of natural resources. An officer of another NGO based in Suva, and who is also involved in the FLMMA Network, confirmed this dissemination effect: "After we made success in one district, people in other villages became interested in marine conservation and having *tabu* [MPA] in their villages. They learned the success from the project leader in another village and asked us to work in their village. Sometimes the media, like radio and newspaper, helps information passed on, but the important point is local people who experienced a good practice in conservation tell other locals in their own words." Building links across neighbouring communities and other external stakeholders for low-cost adjudication

Internal mechanisms based on bonding social capital at the village level are significant for villagers to make the local rules clear at their level. On the other hand, where a community has conflicts with an individual or group outside the community, links across the community may be necessary to mitigate the conflict, because they facilitate communication and knowledge exchange between parties. Such cases could include adjacent or neighbouring communities or other outsiders.

In Cuvu, external ties have been extended to solve potential conflicts with a neighbouring community. Owing to the mobility of coastal resources, establishing rules in one village without doing so in a neighbouring village will produce ineffective institutions that might not be long lasting. Therefore, building networks among villages can provide them with opportunities for inter-communication and knowledge sharing. One village (Yadua) has started collaborative work with a neighbouring village, which has not been involved in the project. To make monitoring easier, Yadua village (Cuvu District) planned to relocate their MPA near the border of the neighbouring village, Volivoli. This cooperative link between villages should support sustainable use of resources.[10] The shared knowledge about conservation may eventually affect neighbouring villagers in their future use of the *qoliqoli*.

(b) Consistency of rules and management strategies at multiple levels

Governance activities organised in multiple layers of nested systems that range from small to large can solve diverse problems involving issues of different scales (Ostrom 1990:102; Ostrom 2000:152). Rules at one level must take rules at other levels into account, or else the system may become incomplete and its sustainability uncertain. If bridging social capital transfers knowledge from government to citizen, it should help to organise rules and strategies of management at the grassroots level consistent with government policy. In other words, if bridging social capital transfers knowledge of national laws to villagers, then community rules made as part of the CBCRM project activities in the two districts should be consistent with the existing legislative framework. For example, villagers are appointed as fish wardens by the Minister for Agriculture, Fisheries and Forests, and their duties are specified in the Fisheries Act. Through NGOs' effort to involve government agencies in the project, the Fisheries Department dispatched its officer to the villages to train and certify the wardens. NGOs also provided the villagers with information on the current national law regarding property rights of marine resources. In the two study areas, villagers understand how the law regulates resource ownership between the nation and local resource users. This has helped to increase common understanding in CBCRM, and to keep the management system consistent and stable.

Bridging social capital also functions to sustain consistent management strategies so as to facilitate sustainable use of resources on a larger scale. Both Cuvu and Wai have conducted coastal management activities within the framework of LMMA, although Cuvu later left the Network. The LMMA Network has developed a "Learning Framework" to share knowledge, skills, resources, and information among participating projects. Participating projects use the framework for monitoring activities, and expect to use the information for understanding the factors that contribute to the success or failure of project activities. NGOs that initiated CBCRM projects in Fiji are well recognised by the government officials at the provincial level, owing to their mobility and financial support.

10. For the purpose of this thesis, bonding social capital is defined as ties among residents within a single district. The ties between Yadua and Volivoli are considered bridging social capital, although it involves neighbour relationships between indigenous Fijians.

Effects of bridging social capital on rule compliance

So far, the results of this study concur with the theoretical functions of bridging social capital as suggested in the literature (Fedderke et al. 1999; Grafton 2005). However, I wish to stress that bridging social capital can affect people's compliance with the rules of resource use. Ostrom (1990) states that the presence of good rules resulting from appropriators' participation does not ensure that appropriators will follow them. She argues that the monitoring of rule conformance could be more important than participating in decision-making. However, in case studies, appropriators' attitudes were affected by the opportunity of participating in the rule-making process.

Every village in both Cuvu and Wai districts has nominated two fish wardens who conduct irregular monitoring activities. On the other hand, no regular external monitoring is implemented, and no external sanctions are effective in both districts. Although there is no distinctive difference between districts regarding monitoring and sanctioning, the degree of compliance with local resource use rules is higher in Cuvu than in Wai. This is the result of the difference in the degree of villagers' participation in rule-making between the two districts, caused by the different project procedure and approaches of the two NGOs. As one respondent commented:

Before the project started, WWF visited first to see the clan chief in the main village of the district. This resulted in a specific project activity. In short, the project put an emphasis on the chief's opinions, and the opportunity for villagers' participation in decision making regarding MPA establishment was limited. Few residents who actually engage in fishing activity were involved in the rule making, and thus lack a sense of participation in the rule making process. One fisher perceives the decision regarding the MPA establishment to have been made unilaterally by the chief: "When the *tabu* [MPA] was put, only chief decided where to put it. Nobody else was involved."

According to this fisher, the previous chief's decision on the location of an MPA, is not sufficient in protecting juvenile fish. Although these fish are found in the river mouth, the MPA cannot protect them sufficiently because it is set in a different place. As the fisher continued: "*Tabu* [MPA] should be put in a place where fish grow. I have seen a lot of baby fish in the river mouth area, but people fish in this area. Now we have *tabu* in other place but it should be in the river mouth. The location should be changed. Other people, I mean fishermen, know this too. If the chance is given, I would like to raise this in the village meeting." The current chief agreed with the fisher's opinion that participation was not enough. Although the residents of Wai who participated in the study respected the previous chief, some discontent was observed with the rule that the ultimate authority lay with the chief and how his decisions may have affected the residents' compliance to MPA rules. Specific attributes of the particular resource need to be considered in rules in CPR management, as argued by Ostrom (1990), as one of the principles for long-enduring CPR is that "Appropriation rules restricting time, place, technology, and/or quantity of resource units are related to local conditions and to provision rules requiring labour, material, and/or money" (Ostrom 1990:90).

Detailed in her later work (Ostrom 1998b), and one of the important points this principle suggests, is that the rules must have a linkage with local ecological conditions. However, as a Wai villager stated, the specific attributes of the marine resources in these particular areas, which have been built up in interactions with villagers' resource use patterns, were not taken into account in designing rules in use. The ecological congruence between institutions and local conditions may not be as strong in Wai District, owing to a project process that failed to incorporate villagers' local knowledge, particularly in rule making. This discourages villagers from complying with the rules of resource use.

Conclusions

In this article I have analysed the function of bonding and bridging social capital in CBCRM in Cuvu and Wai districts. Previous studies on Fiji argued that traditional practices that contribute to conserving coastal resources have been largely maintained (e.g. Veitayaki et al. 2001). Operations of those practices, such as imposing seasonal bans, temporary no-take areas, or restricting particular types of fishing methods, are supported by strong bonds that have been formed in Fijian communities. Traditional norms of hierarchy restrict people's behaviour and require obedience to the community's rules. These rules are often arbitrarily imposed by a chief or another elder, and strong bonds that facilitate trust among the people in the community are necessary to maintain long-enduring CBCRM institutions.

By building bridging social capital with NGOs, villages of Cuvu and Wai gained access to new knowledge and information on coastal resource management and MPAs. Bridging social capital between Fijian communities can work to mitigate or avoid conflict between them, by facilitating understanding of CBCRM objectives and rules in another village. Further, bridging social capital connects the village and different levels and types of organisations, particularly government agencies. By providing not only knowledge to villages, but also incor-

porating government agencies into the process of CBCRM, local rules, such as the village fish warden system, can be consistent with the existing legislative framework, thereby leading to greater stability in the entire management system.

The two NGOs chose different strategies in their community-based projects, and the results were different. When relationships were built that took into consideration the interests of each community member, rather than considering the community as a homogeneous unit, rule compliance was higher. The "individual approach", which allowed individual villagers to participate in the process of MPA formulation, was more successful in the involvement of community members. The lack of participation failed to incorporate resource users' knowledge and experience into management planning, resulting in the lower congruence between institutions and local conditions. However, to enable generalisation of the effect of NGO approaches to CBCRM, further examination is required of how other factors, such as attitudes of the chiefs or the degree of each villager's involvement in the market economy, is responsible to villagers' compliance with local rules.

The study reported on here aimed to explain how different types of social capital function in CBCRM in Fiji. It does not make any assumptions of moral superiority of a given type of social capital in Fijian society. However, whatever the characteristics of social capital in a particular community, rural Fijians are increasingly under pressure to participate in a global economy, thus bringing pressure on local natural resources. These changes in the lives of Fijian people require higher levels of bridging social capital for the purpose of coastal management. This allows people in a small community to obtain the new ideas, technology and funds that are necessary to improve the status of natural resources. To improve marine resource management at the village level, the challenge is to identify a strategy for building bridging social capital that is consistent with the bonding ties that already exist.

Acknowledgements

I wish to thank the interviewees and survey participants in Fiji, without whose support this research would not have been possible. Special thanks are also due to numerous individuals and organisations in Fiji, notably the World Wide Fund for Nature South Pacific Programme, the Partners Community Development Fiji and the Institute of Applied Science of the University of the South Pacific for their assistance. I also wish to thank Luca Tacconi, Meg Keen, Joeli Veitayaki and Colin Filer for their research supervision. Funding for this research was provided by the Crawford School of Economics and Government, Australian National University; the Foundation for Advanced Studies on International Development; and the Joint Japan/World Bank Graduate Scholarship Program.

References

Ahn T.K. and Ostrom E. 2001. Social capital and the second-generation theories of collective action: An analytical approach to the forms of social capital. Annual Meeting of the American Political Science Association, Boston, MA.

Bullen P. and Onyx J. 1998. Measuring social capital in five communities in NSW: A practitioner's guide. NSW, Management Alternatives. Available: http://www.mapl.com.au/A2.htm.

Clark J.R. 1995. Coastal management handbook. Boca Raton, USA: CRC Press, Inc.

Coleman J.S. 1988. Social capital in the creation of human capital. American Journal of Sociology 94:S95–S120.

Côté S. and Healy T. 2001. The well-being of nations: The role of human and social capital. Paris, France: Organisation for Economic Co-operation and Development, Centre for Educational Research and Innovation.

Fedderke J., De Kadt R and Luiz J. 1999. Economic growth and social capital: A critical reflection. Theory and Society 28:709–745.

Frazer R. 1973. The Fijian village and the independent farmer. p. 75–96. In: The Pacific in transition: Geographical perspective on adaptation and change. Brookfield H. (ed.). Canberra: Australian National University Press.

Fukuyama F. 1995. Social capital and the global economy. Foreign Affairs 74:89–103.

Gibson C.C., Williams J.T. and Ostrom E. 2005. Local enforcement and better forests. World Development 33:273–284.

Gilbert A. and Gugler J. 1982. Cities, poverty, and development: Urbanization in the third world. Oxford, U.K.: Oxford University Press.

Gillett R. and Lightfoot C. 2001. The contribution of fisheries to the economies of Pacific island countries: A report prepared for the Asian Development Bank, the Forum Fisheries Agency, and the World Bank. Manila, Philippines: Asian Development Bank.

Gittell R. and Vidal A. 1998. Community organizing: Building social capital as a development strategy. Thousand Oaks, USA: Sage Publications.

Grafton R. Quentin. 2005. Social capital and fisheries governance. Ocean and Coastal Management 48:753–766.

Granovetter M.S. 1973. The strength of weak ties. The American Journal of Sociology 78:1360–1380.

Grootaert C., Narayan D., Woolcock M. and Nyhan-Jones V. 2003. Integrated questionnaire for the measurement of social capital (SC-IQ). The World Bank, Social Capital Thematic Group.

Halpern D. 2005. Social capital. Cambridge: Polity Press.

Harpham T., Grant E. and Thomas E. 2002. Measuring social capital within health surveys: Key issues. Health Policy Planning 17:106–112.

Huber M. and McGregor K. 2002. A synopsis of information relating to marine protected area: volume 1. Apia, Samoa: Secretariat of the Pacific Regional Environmental Programme.

King M. and Lambeth L. 2000. Fisheries management by communities: A manual on promoting the management of subsistence fisheries by Pacific Island communities. Noumea, New Caledonia: Secretariat of the Pacific Community.

Lagibalavu M. 1994. Traditional marine tenure and policy recommendations: The Fijian experience. p. 269–273. In: South R.G., Goulet D., Tuqiri S. and Church M. (eds). Traditional marine tenure and sustainable management of marine resources in Asia and the Pacific. University of the South Pacific, Suva, Fiji: International Ocean Institute.

Lin N. 2001. Social capital: A theory of social structure and action. Cambridge: Cambridge University Press.

LMMA Network. 2003. Learning framework for the Locally-Managed Marine Area Network (Version 2.1). Suva, Fiji: LMMA Network.

LMMA Network. 2005. The Locally-Managed Marine Area Network 2004 Annual Report.

Maxwell J.A. 1996. Qualitative research design: An interactive approach. Thousand Oaks, USA: Sage Publications.

Narayan D. 1997. Voices of the poor - poverty and social capital in Tanzania. Washington DC: The World Bank.

Narayan D. and Cassidy M. 1999. A dimensional approach to measuring social capital: Development and validation of a social capital inventory. Current Sociology 49:59–102.

Narayan D. and Pritchett L. 1999. Cents and sociability: Household income and social capital in rural Tanzania. Economic Development and Cultural Change 47:871–897.

Nayacakalou R.R. 1978. Tradition and change in the Fijian village. Suva, Fiji: University of the South Pacific.

Nicholson, Norman. 1993. The state of the art. p.3–39. In: Ostrom V., Feeny D. and Picht H. Rethinking institutional analysis and development: Issues, alternatives, and choices. San Francisco, USA: ICS Press.

North D.C. 1990. Institutions, institutional change, and economic performance. New York: Cambridge University Press.

Ostrom E. 1990. Governing the commons: The evolution of institutions for collective action. Cambridge; New York: Cambridge University Press.

Ostrom E. 1998a. A behavioral approach to the rational choice theory of collective action presidential address. The American Political Science Review 92:1–22.

Ostrom E. 1998b. Self-governance and forest resources. Bogor, Indonesia: Center for International Forestry Research.

Ostrom E. 2000. Collective action and the evolution of social norms. The Journal of Economic Perspectives 14:137–158.

Patton M.Q. 2002. Qualitative research and evaluation methods. Thousand Oaks, USA: Sage Publications.

Putnam R.D. 2000. Bowling alone: The collapse and revival of American community. New York: Simon and Schuster.

Putnam R.D., Leonardi R. and Nanetti R.Y. 1993. Making democracy work: Civic traditions in modern Italy. Princeton, USA: Princeton University Press.

Ravuvu A. 1983. Vaka i taukei: The Fijian way of life. Suva: Institute of Pacific Studies of the University of the South Pacific.

Rudd M.A. 2000. Live long and prosper: collective action, social capital and social vision. Ecological Economics 34:131–144.

Sandel M.J. 1984. The procedural republic and the unencumbered self. Political Theory 12:81–96.

Sano Y. in press. Social and institutional arrangements in coastal common pool resource systems: Preliminary results of a study of community-based coastal management in Fiji. Tropics 17.

Tashakkori A, and Teddlie C. 1998. Mixed methodology: Combining qualitative and quantitative approaches. Thousand Oaks, USA: Sage Publications.

UNEP. 1999. Pacific Islands environment outlook. London: Chapman Bounford & Associates.

Veitayaki J., Aalbersberg B., Tawake, A. Rupeni E. and Tabunakawai K. 2001. Mainstreaming resource conservation: The Fiji Locally Managed Marine Area Network and its influence on national policy development. p. 10. In: Technical Report Working Paper no. 42, Resource Management in Asia-Pacific (RMAP) Program. Canberra: Research School of Pacific and Asian Studies, Australian National University.

Woolcock M. 1998. Social capital and economic development: Toward a theoretical synthesis and policy framework. Theory and Society 27:151–208.

Woolcock M. and Narayan D. 2000. Social capital: Implications for development theory, research, and policy. The World Bank Research Observer 15:225–249.

World Bank. 1999. Voices from the village: a comprehensive study of coastal resource management in the Pacific Islands. Washington DC: The International Bank for Reconstruction and Development.